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American Machinist

January 27, 1937

Review and Catalog Number

A summary of Machine Tools, Small Tools, Shop Equipment, Accessories, Parts and Materials made available to the metal-working industry during 1936.

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✦ In the pages following will be found in condensed form the various items of new metal-working equipment announced in *American Machinist's* Volume 80. They are arranged and indexed to provide a convenient guide to the manufacturing executive wishing to modernize his plant facilities.

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Volume 81 — Number 2

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To Help You Buy . . .
ALL THROUGH 1937

This 24th Annual Review & Catalog Number is the most complete showing of modern machine tools, small tools, accessories, materials, and supplies that you can get for use in buying.

Reference data in the

REVIEW OF 1936 NEW PRODUCTS

This number contains a complete re-printing of all the new product descriptions that have been appearing in the 26 issues of 1936 in the "Shop Equipment News." Each description is rewritten in condensed form, contains an illustration of the product, and the name and address of the manufacturer. See page 112 for the Index.

Reference data in the

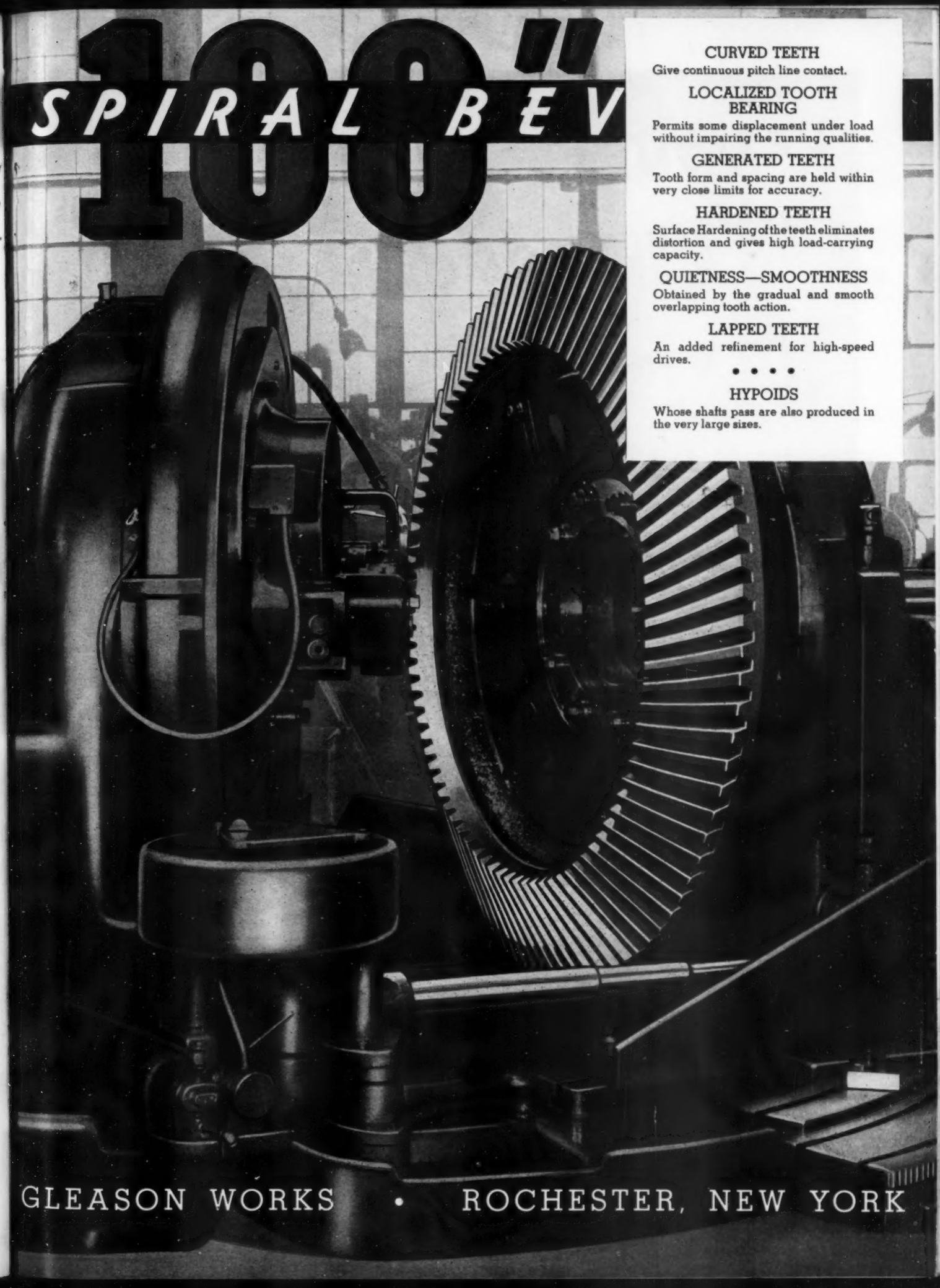
WHERE-TO-BUY DIRECTORY

For several years, American Machinist has been building this big directory of machinery, tools, materials, and supplies for metal-working plants. It is several times as large as the usual Where-to-Buy Directory which appears in every issue . . . with many more headings, and many more manufacturers. See page 230.

Reference data in the

ADVERTISEMENTS

Many advertisers take extra space to "catalog" their products adequately. Obviously, few plants can maintain up-to-date catalog files on all the hundreds of products that they must buy. Therefore, this enlarged advertising section is a great practical help when you buy. See the last page in the book for the Index.



CURVED TEETH
Give continuous pitch line contact.

LOCALIZED TOOTH BEARING
Permits some displacement under load without impairing the running qualities.

GENERATED TEETH
Tooth form and spacing are held within very close limits for accuracy.

HARDENED TEETH
Surface Hardening of the teeth eliminates distortion and gives high load-carrying capacity.

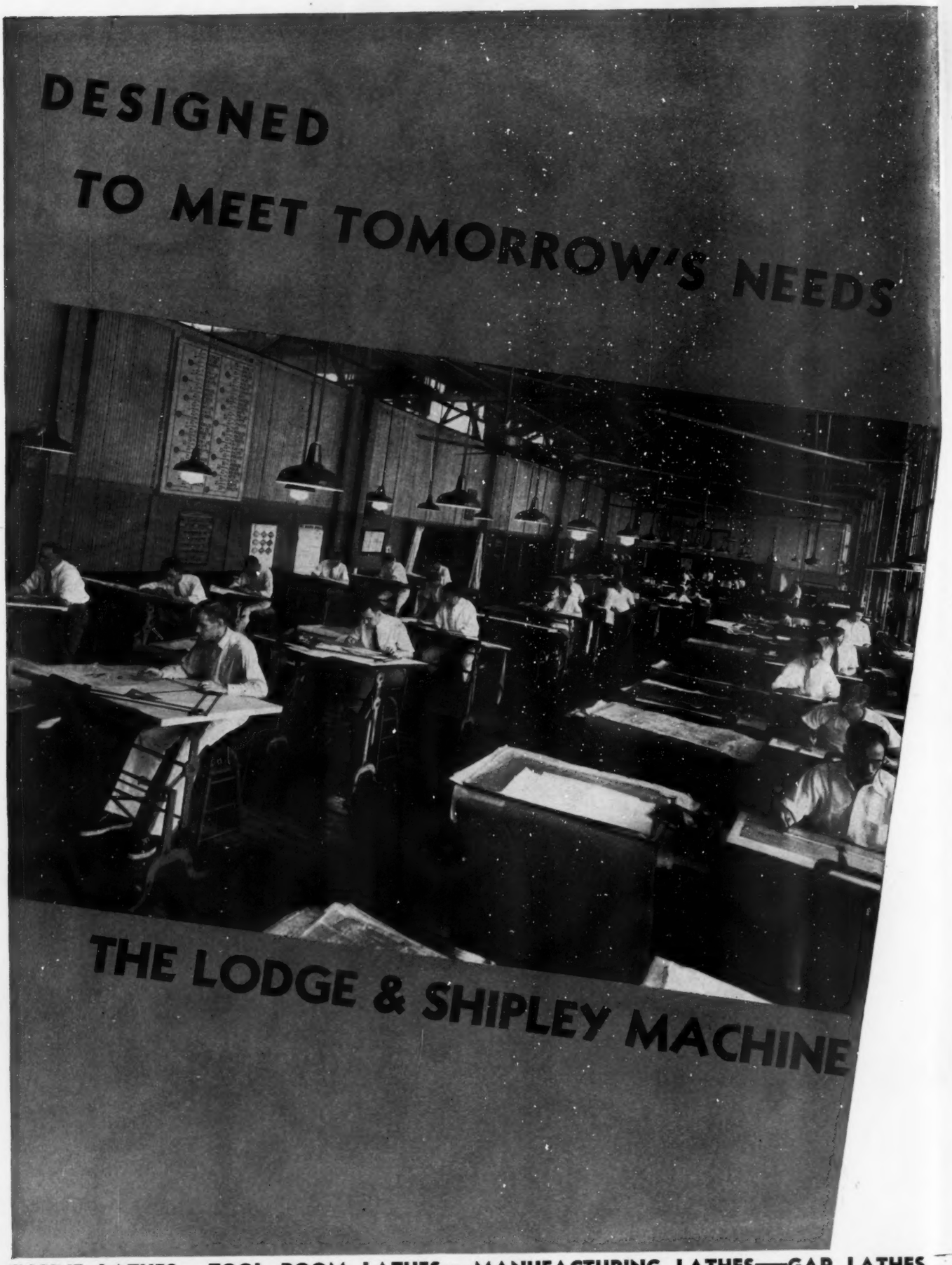
QUIETNESS—SMOOTHNESS
Obtained by the gradual and smooth overlapping tooth action.

LAPPED TEETH
An added refinement for high-speed drives.

• • • •

HYPOIDS
Whose shafts pass are also produced in the very large sizes.

GLEASON WORKS • ROCHESTER, NEW YORK



ENGINE LATHES—TOOL ROOM LATHES—MANUFACTURING LATHES—GAP LATHES

WITH TODAY'S EQUIPMENT

Backed by experience gained since 1893 in the specialized manufacture of fine lathes, every Lodge & Shipley lathe in service today represents a combination of excellent design and sound manufacture.

Designed by engineers who temper originality of design with years of practical experience, a modern Lodge & Shipley lathe makes it possible "to meet tomorrow's needs with today's equipment."

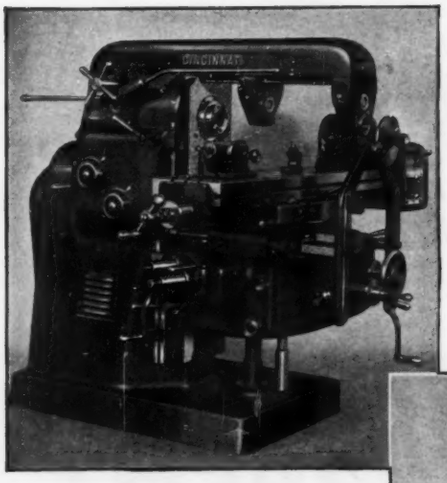
Manufactured by craftsmen, sincere in the conviction that only a constant attention to even the smallest detail can produce a fine tool, a Lodge & Shipley lathe possesses a perfection of manufacture that insures years of accurate service.

Thus the motto of "Lathes—Good Lathes Only" is far more than a trade slogan. It is accepted as a pledge of faith to the users of fine machine tools everywhere.

TOOL CO., CINCINNATI, OHIO

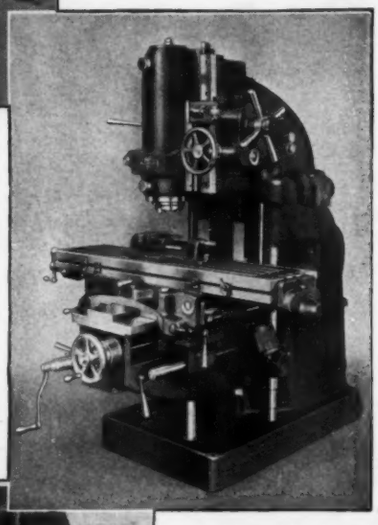
DUOMATIC LATHES—HIGH-SPEED LATHES—PORTABLE LATHES—DRILLING LATHES—CRANKSHAFT LATHES—OIL COUNTRY LATHES

1937 and YOUR



Horizontal Dial Type Milling Machine

A general-purpose milling machine for tool-room or manufacturing work. Made in the Nos. 2, 3 and 4 sizes, plain or universal, high speed or medium speed.

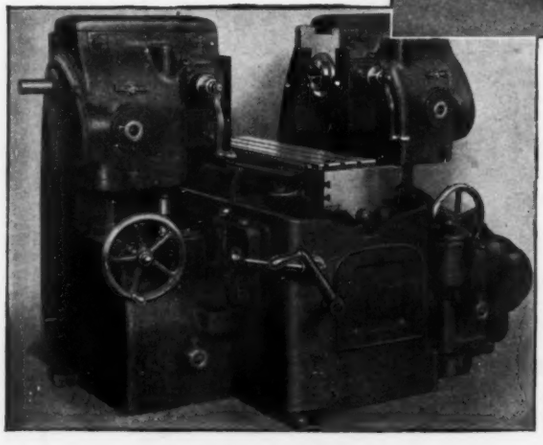


Meet your 1937 shop requirements with these cost-reducing Cincinnati Machines. Reduced cutting times, made possible by more powerful drives and faster speeds . . . greater operating convenience . . . improved safety features . . . refinements in accuracy which are reflected in your product. These are the characteristics of the Cincinnati Machines which will help you in your 1937 manufacturing requirements . . . and make your old equipment an absolute expense for you to keep.

Complete information on these machines is yours for the asking.

The Cincinnati Milling Machine Co.
Cincinnati Grinders Incorporated
Cincinnati, Ohio, U.S.A.

These machines are fully covered by patents and patents pending.

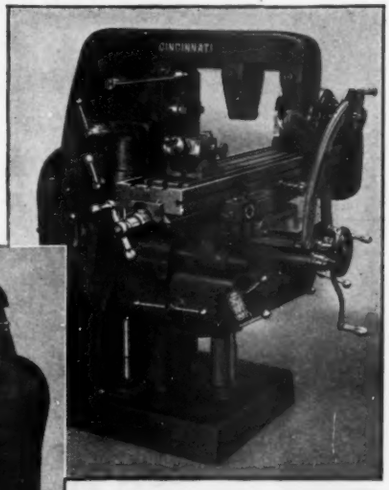


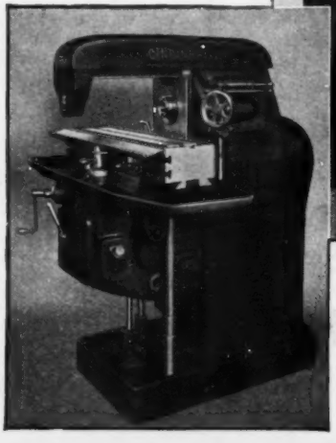
Duplex Hydromatic

A fixed bed milling machine, having automatic table cycles, for lots ranging from medium quantities to continuous production. Made in plain duplex and multiple spindle styles, and various sizes ranging from 24″ to 90″ table travels.

Vertical Dial Type Milling Machine

A general-purpose milling machine for tool-room or manufacturing work. Made in the Nos. 2, 3 and 4 sizes, high speed or medium speed.





No. 1-12 Milling Machine

A small automatic table cycle milling machine for rapid production of the small work-piece, such as typewriter parts, small firearms, etc. Built with 12″ and 18″ table travel.

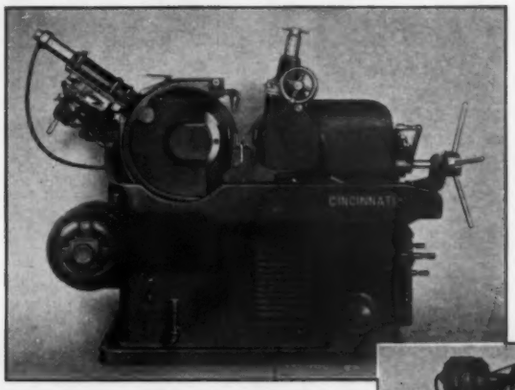
L-Type Milling Machine

A small general-purpose milling machine, for the small to average size work-piece in the tool room. Made in the No. 2 size, plain or universal. The MH built in the same size but heavier and more powerful is also available.

THE CINCINNATI MILLING MACHINE CO.

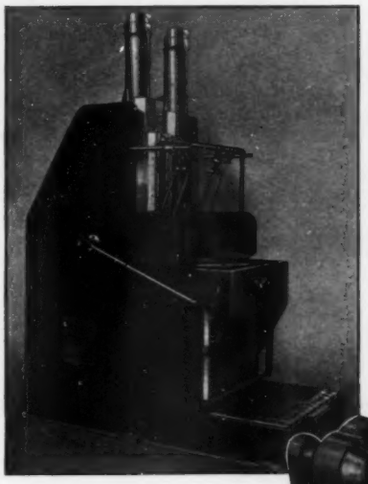
CINCINNATI

SHOP



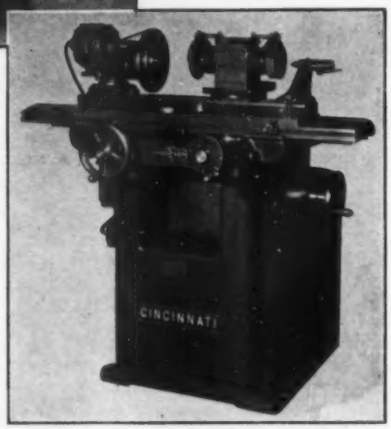
No. 2 Centerless Grinding Machine

A machine for grinding straight or tapered cylindrical parts by the centerless method. Very accurate and rapid production. Made in various sizes and styles. Adaptable to grinding bar work.



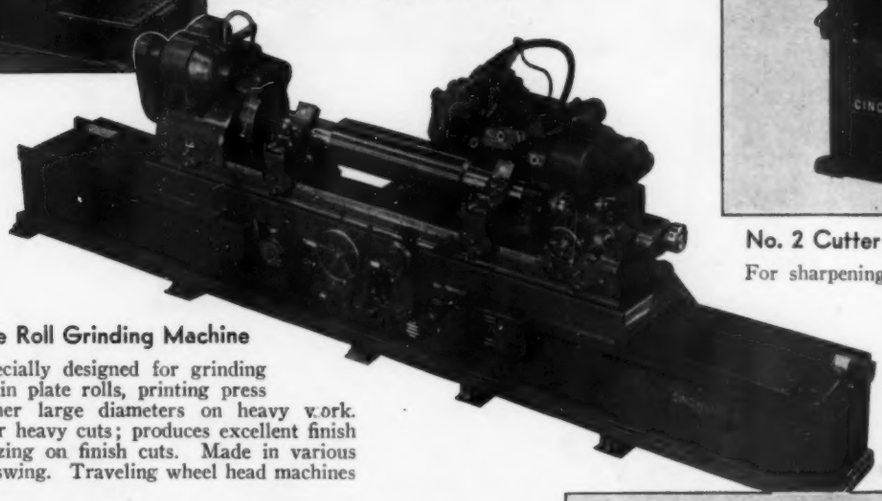
Duplex Vertical Hydro-Broach Machine

A surface broaching machine for large quantities of the medium size work-piece. Very accurate and rapid production. Made in various sizes, ranging from 36″ to 54″ strokes. Horizontal machines available.



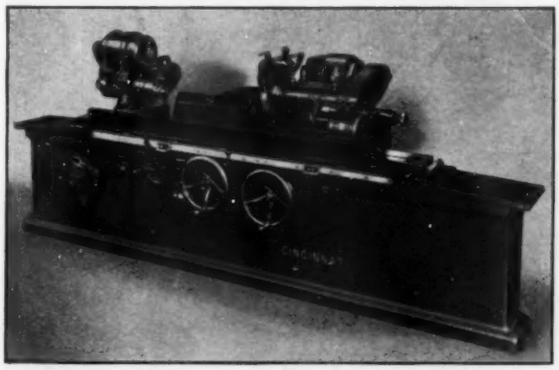
No. 2 Cutter Sharpening Machine

For sharpening milling cutters, reamers, hobs, or any other cutting tool used in a machine shop. Also very convenient for grinding gages or other light tool room work. Plain or universal style.



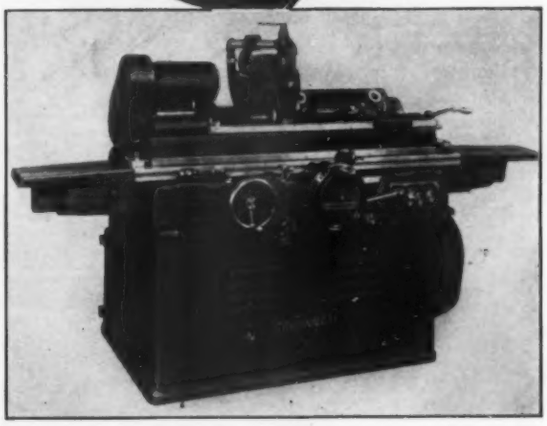
Traveling Table Roll Grinding Machine

A machine especially designed for grinding working rolls, tin plate rolls, printing press drums, and other large diameters on heavy work. Very rugged for heavy cuts; produces excellent finish and accurate sizing on finish cuts. Made in various sizes up to 28″ swing. Traveling wheel head machines also available.



Universal Self-Contained Grinding Machines

For accurately grinding medium to large size work by the between-center method. Made in the plain and universal styles, 14″ to 16″ swing, and various lengths up to 168″ between centers.



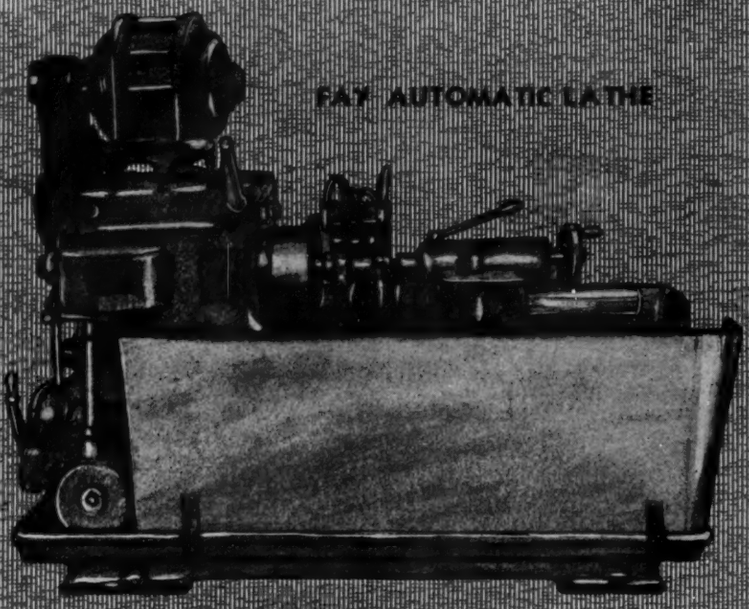
Plain Hydraulic Grinding Machine

For accurately grinding small to medium size work. Very simple to operate and rapid producer. Made in the plain style only, 6″ or 10″ swing, 18″ and 30″, or 18″ and 36″, respectively, between centers.

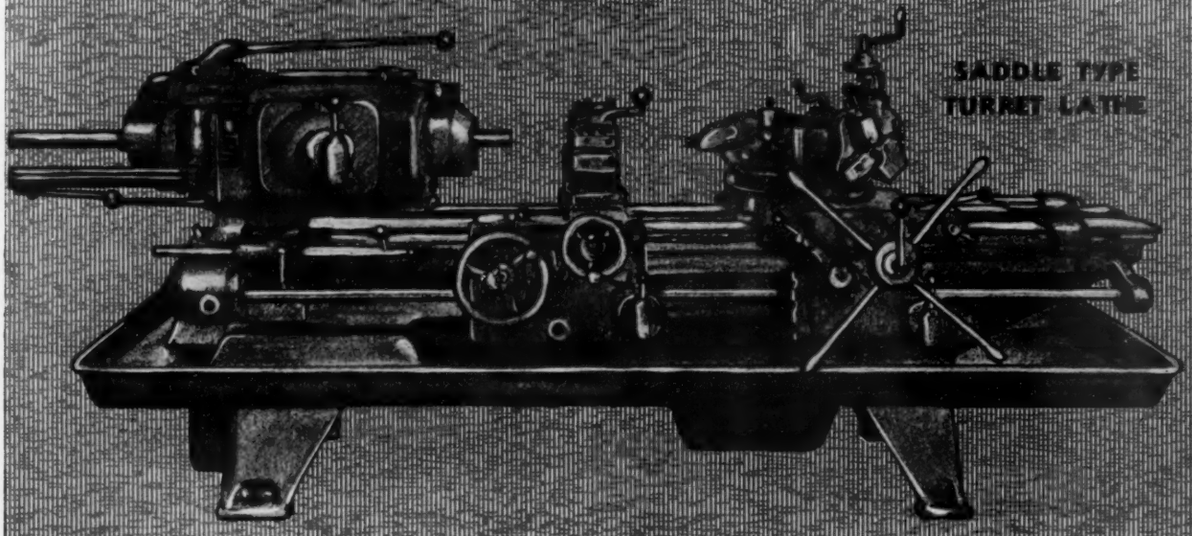
CINCINNATI GRINDERS INCORPORATED

CINCINNATI, OHIO U.S.A.

A COMPLETE LINE



FAY AUTOMATIC LATHE

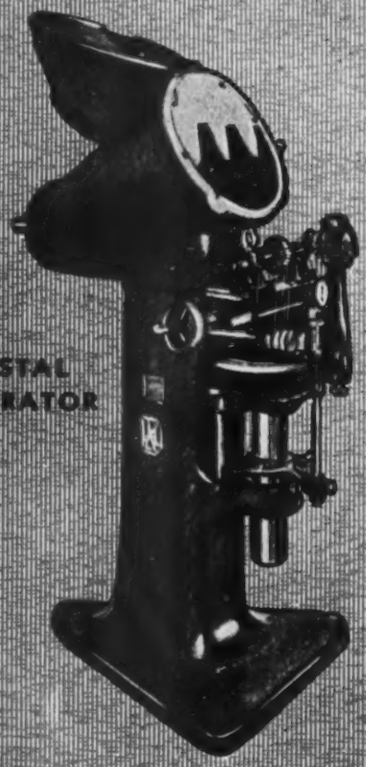


SADDLE TYPE
TURRET LATHE

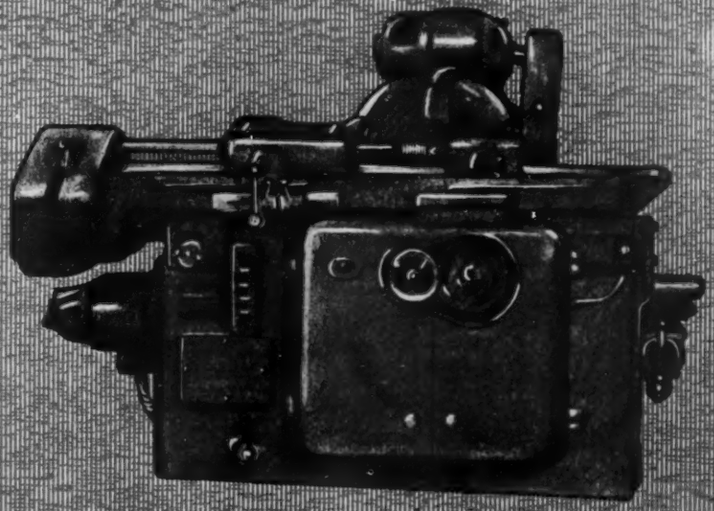
JONES & LAMSON MACHINE

COMPLETELY MODERN

STATIONARY TANGENT DIE



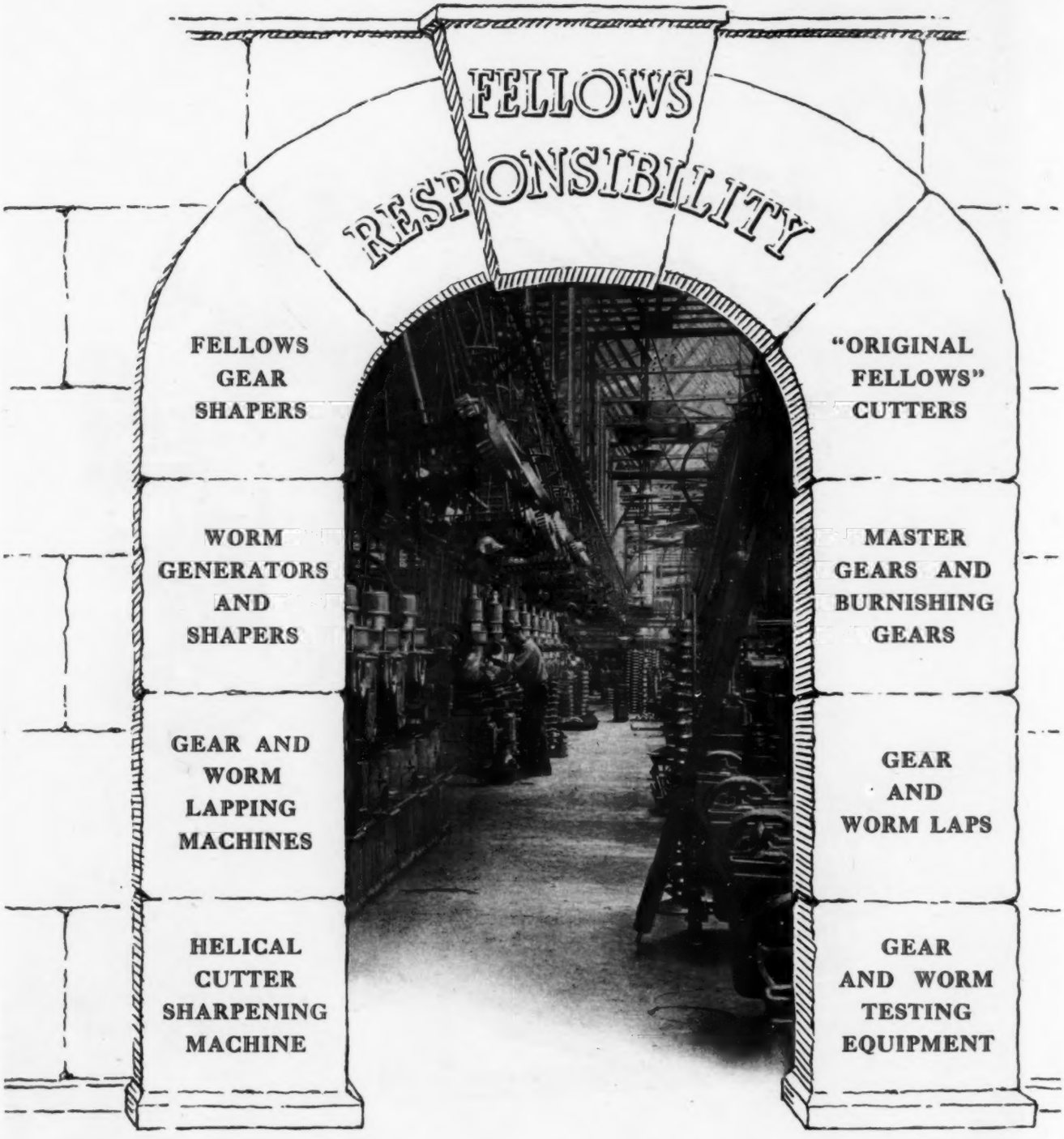
PEDESTAL COMPARATOR



AUTOMATIC THREAD GRINDING MACHINE

COMPANY, Springfield, Vermont, U. S. A.

Accuracy in Gear



Manufacture

is best controlled by *Unified Methods*

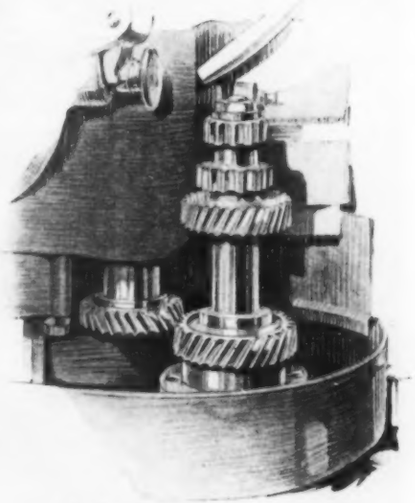
Well informed production executives appreciate the necessity for a unified control over manufacturing methods—and this is particularly true with respect to gear production.

It is obvious that the more intimately related the progressive machining, inspecting, finishing and testing operations, the more positive the control over accuracy.

In those plants where Fellows Methods are utilized throughout the different steps of manufacture, it has been demonstrated that a proper balance between roughing, finishing and testing operations smoothes out production difficulties.

The Fellows Method comprises: one standard of accuracy; one basic control over cutter duplication; and one single responsibility for the successful functioning of the entire tool equipment.

For 1937, you can make no better resolution than to entrust more of the responsibility for your high-accuracy gear production to the Fellows Gear Shaper Company, Springfield, Vermont—or 616 Fisher Bldg., Detroit, Mich.



The Keystone of the Arch of Fellows Responsibility—"Original" Fellows Gear Shaper Cutters.

FELLOWS
GEAR SHAPER METHODS

CINCINNATI
A SYMBOL OF A DEFINITE STANDARD
OF WORTH
Handle
CINCINNATI
CINCINNATI GRINDERS INCORPORATED

Accuracy with Care...

After exhaustive study in our research laboratories... after testing by thousands of different jobs in our shops and other shops... a remarkable "accuracy" has been attained in the Cincinnati 14" and 16" Plain Self-Contained Grinding Machines. We handled accuracy with care.

For example, consider the grinding wheel spindle bearings ...the very heart of a cylindrical grinding machine. These bearings have proven their capability of improving your grinding finishes and accuracy with increased production.

You, the careful manufacturer, are assured of accuracy with these machines in your shop. Let us send you the complete catalog describing these machines.

How You Can Profit

by These 6 Features . . .

Load Compensating Spindle Bearings.
Increase Your Rate of Production.

•

Better Finish.
Increases the Life of Your Product.

•

Low Maintenance Cost.
Increases Investment Return.

Accurate Sizing.
Simplifies Your Interchangeable Manufacturing Problems.

•

Pre-Lubricated Spindle.
Cuts Down Repair Bills.

•

Negligible Down Time.
Speeds Up Your Production Schedule.

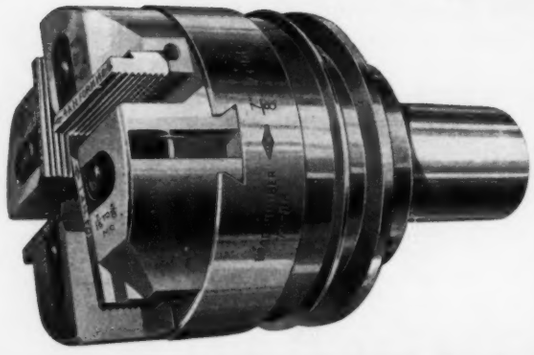
CINCINNATI, OHIO, U. S. A. • • • •

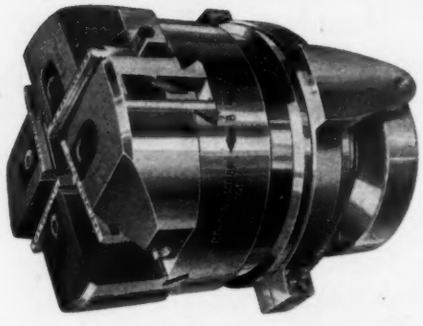
1937 THREAD CUTTING EQUIPMENT . . . .

by LANDIS

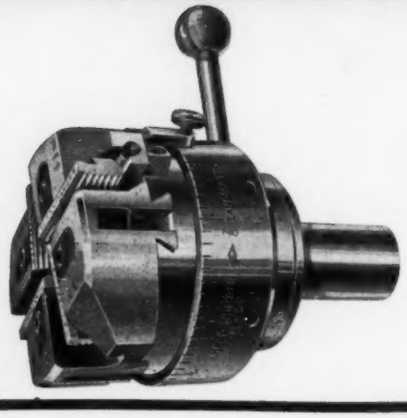
REG. U. S. TRADE MARK PAT. OFF.

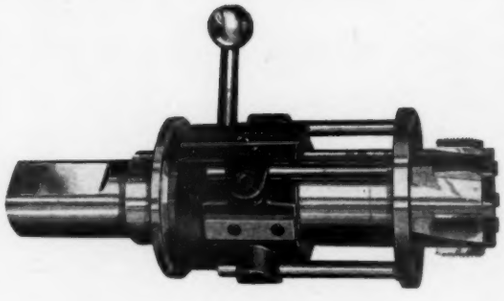
LANDEX DIE HEADS • LANCO DIE HEADS





LANDMATIC DIE HEADS • LANDIS COLLAPSIBLE TAPS





The LANDIS Line

Standard Threading Machines
LANDMACO Threading Machines
Bolt Factory Threaders
Automatic Forming and Threading Machines
Pipe Threading and Cutting Machines
Pipe and Nipple Threading Machines
Roller Pipe Cutters
Chaser Grinders
Rotary Bolt Threading Die Heads
Stationary Pipe Die Heads
LANDMATIC Heads for Turret Lathes
LANDEX Heads for Automatic Screw Machines
LANCO Heads for Hand-operated Threading Machines
LANDIS Collapsible and Adjustable Taps

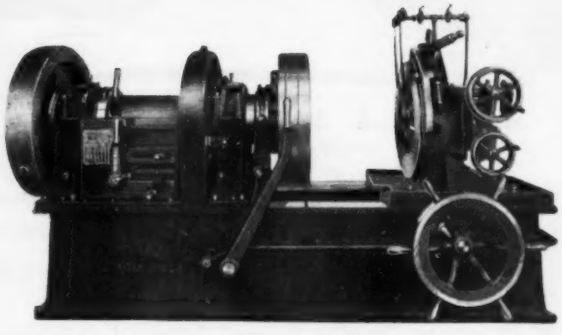
In the LANDIS Line are included all types of modern Thread Cutting Machines, Die Heads and Collapsible Taps for every production and maintenance requirement.

Whether your problem is one of greater production, increased accuracy or lower costs, *or a combination of all three,* depend upon it—LANDIS has the answer!

LANDMACO THREADING MACHINES

LANDIS AUTOMATIC FORMING and THREADING MACHINES

LANDIS PIPE THREADING and CUTTING MACHINES

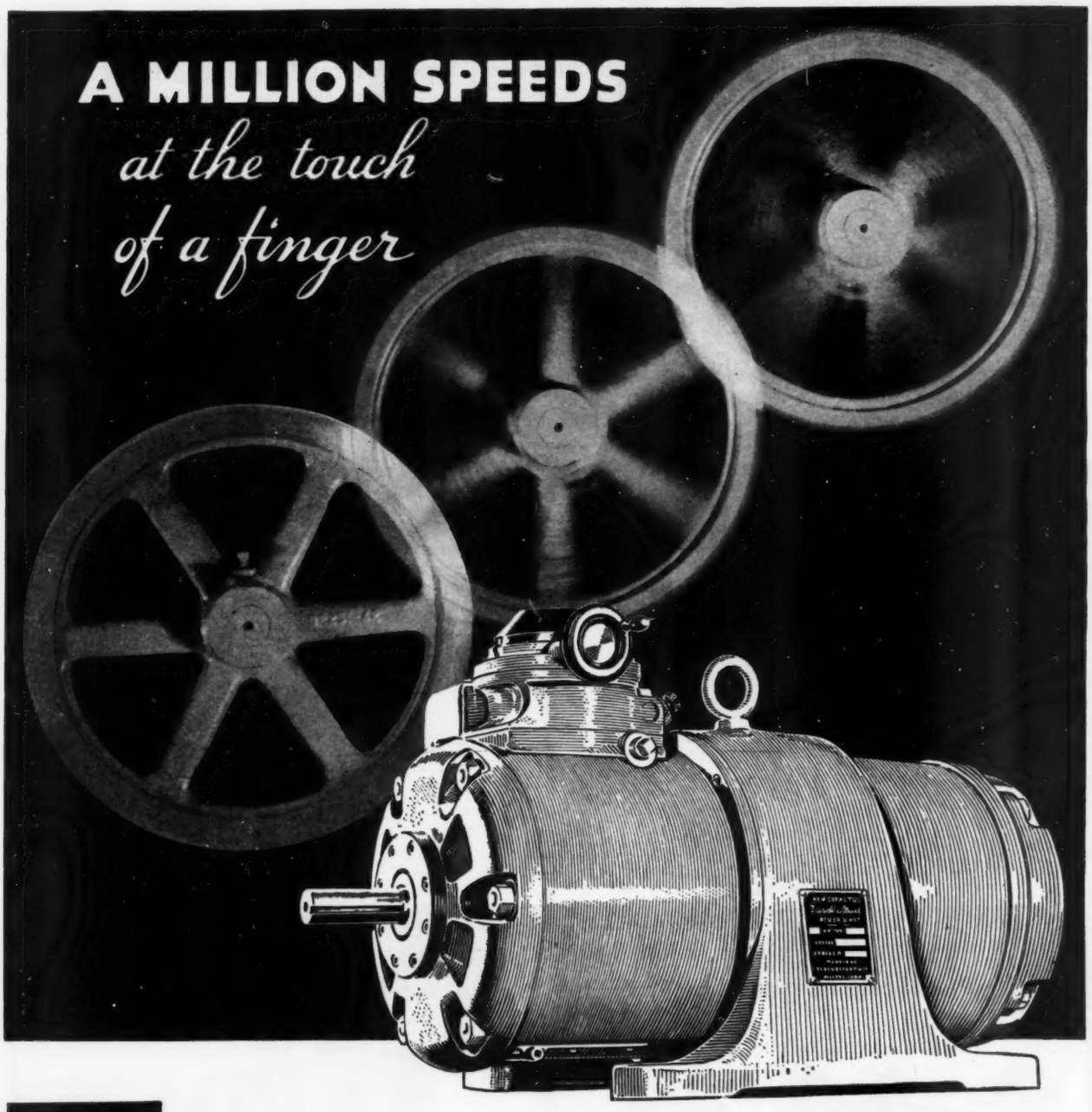


LANDIS BOLT FACTORY THREADERS

LANDIS MACHINE CO. . . INC.
Waynesboro, Pa.

A MILLION SPEEDS

at the touch of a finger



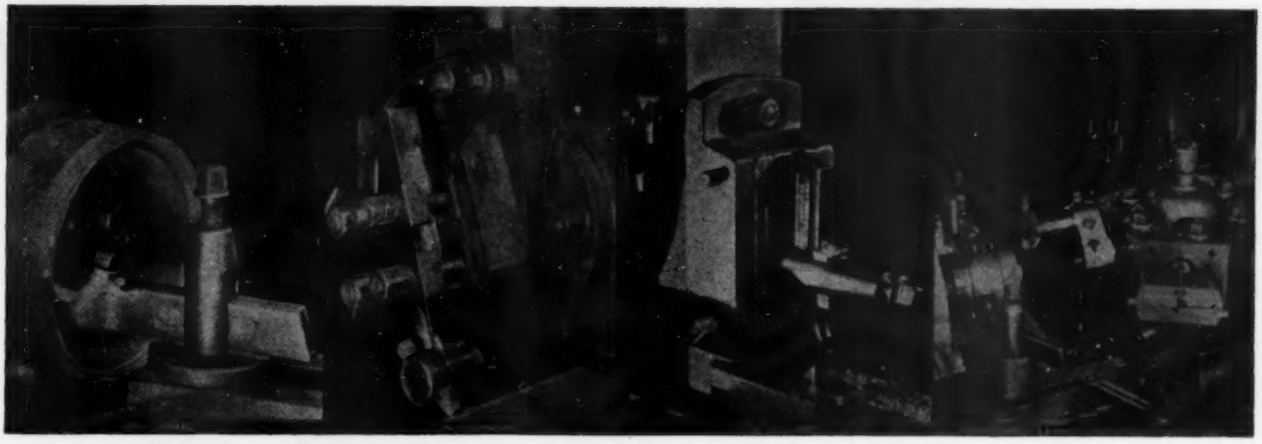
TRANSITORQ
TRADE MARK

Transitorq gives more than infinite speed change — more than exactly the speeds required on a job — for among all variable speed devices its EASE OF CONTROL is outstanding. No more than the merest touch of a finger on the control wheel is needed — a light, sensitive action which greatly facilitates the use of remote controls of every type. But with this marvelous ease of operation, Transitorq assures a *positive drive* — and there are no continuous wearing parts to require replacement. . . . New Departure Division General Motors Corporation, Bristol, Connecticut; Detroit, Chicago and San Francisco.

NEW DEPARTURE *Variable Speed* TRANSITORQ

2529-P

ARMSTRONG
System of TOOL HOLDERS



The Business End of Every Machine Tool is at its Cutting Point

PROFITS are made or lost at the cutting point of machine tools, for it is there that the work is done. The cutting tool as well as the man or his machine determines efficiency or inefficiency, accomplishment or delay, profit or waste, success or failure.

Permanent, Multi-Purpose Tools

The making of tools for standard operations is no longer a one-man task but has become the work of an institution which can coordinate the findings of cutting tool experts with the experience of thousands of shops. It is work for specialists who can specify steels; work out exact sizes and shapes; who command every modern facility for producing better tools.

ARMSTRONG TOOL HOLDERS used today in over 96% of the machine shops and tool rooms, "Save all Forging, 70% Grinding, and 90% High Speed Steel". They reduce "tooling-up" to the selection of the cutter, adjustment for clearance and tightening of the set screw. Each is a permanent, multi-purpose tool that with a few cutter bits (quickly ground from stock shapes of high speed steel) effectively equals a complete set of forged tools. With ARMSTRONG TOOL HOLDERS you are permanently tooled-up, are always ready to start work. Large stocks of costly cutting steels are no longer necessary nor must you absorb direct loss in useless tool "stumps."

Stronger, More Efficient Tools

You will find in each ARMSTRONG TOOL HOLDER maximum strength and rigidity, maximum utility not only for the operation of today but for tomorrow's job as well. Cutting angles and tool range will be correct—worked out and proven.

Comprising over 100 sizes and shapes, the Armstrong System of Tool Holders provides for every operation on Lathes, Planers, Slotters and Shapers and for standard operations on Turret Lathes and Screw Machines. The new ARMSTRONG TURRET LATHE and SCREW MACHINE TOOLS embody the same basic principle as other ARMSTRONG TOOL HOLDERS and are manufactured and sold as standard tools.

While ARMSTRONG TOOL HOLDERS take cutter bits of standard high speed steel shapes—cutters that can be bought anywhere, at any time—one of the developments of the Armstrong System is ARMSTRONG HIGH SPEED Bits and Blades. ARMSTRONG HIGH SPEED Steel Bits and Blades are individually heat treated and tempered; are accurate in size and surface. Each is strictly speaking a fine tool in the rough that is capable of operation at greatly increased speeds and feeds and open a new avenue for increasing hourly production. So slight is the cost of the cutting steel compared with the man and machine hours it governs, there can be only one truly economical cutting steel—the very finest obtainable—ARMSTRONG HIGH SPEED.

ARMSTRONG TOOL HOLDERS are as available as your nearest Mill Supply House—can be purchased as needed, when needed. Adding but a tool at a time, it is possible to build your Armstrong System of Tool Holders without special investment, without interruption, without even disturbing any tool set-up you may now employ.

Lower tool costs, lower cutting-costs and step up production and profits by standardizing on ARMSTRONG TOOL HOLDERS for lathes, planers, shapers, turret lathes and screw machines.

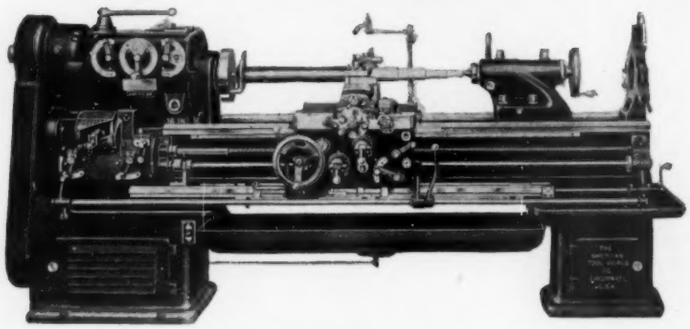
ARMSTRONG BROS. TOOL CO. 315 N. Francisco Ave., Chicago, U.S.A.
"The Tool Holder People"
New York Sales Office: 199 Lafayette St.

Pacific Coast Office: 661 Folsom St., San Francisco, Cal.
London Branch: ARMSTRONG BROS. TOOL CO., Ltd.

AMERICAN TOOLS.

LATHES

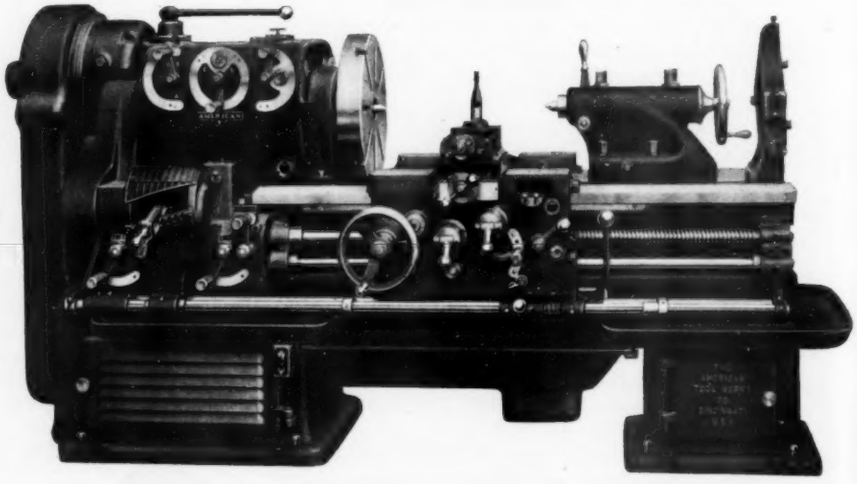
"AMERICAN" MULTI PRODUCTION LATHES



This thoroughly modern, fast, powerful machine is provided with time-saving features which make it highly profitable for handling short runs of duplicate work.

Among the features which assure high productivity and low set-up time are Direct-Reading Cross Feed Dials, a scale for setting longitudinal stop dogs, a perfected chip breaker, and a system for providing an abundant supply of coolant to the cutting tool. Heavy cuts at high speed and ample power and stamina for the use of modern cutting alloys assure outstanding savings in production.

"AMERICAN" HIGH DUTY LATHES



Accuracy, and easy operation are outstanding characteristics of these "AMERICAN" Lathes.

Among the important features are: a 100% anti-friction headstock, including starting clutch, brake unit, all shafts and every loose sleeve.

Heavy cuts, fast speeds, continuous accuracy and superior finish are assured through sturdy construction and ample power.

Convenience in operation is assured by placing quick acting controls within easy reach.

"AMERICAN" also offers PRECISION Tool Room LATHES of inherently high accuracy. These machines assure the highest degree of quality work and dependable service.

THE AMERICAN TOOL WORKS

. . for the Modern Shop

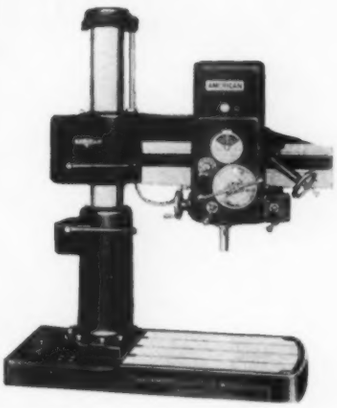
RADIALS

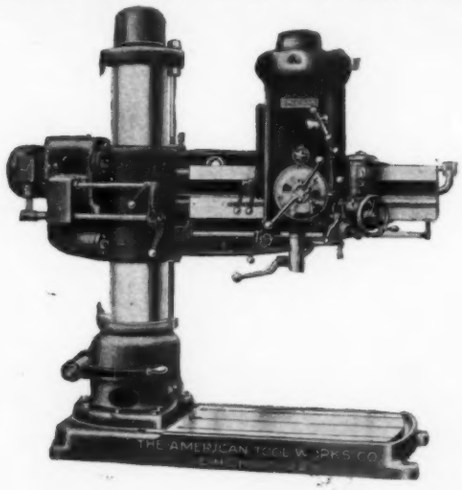
"AMERICAN" TRIPLE PURPOSE RADIALS

Known as "pacemakers in production," these machines feature a range of correct speeds and feeds or boring, tapping and high speed drilling.

Equipped with anti-friction bearings throughout, "AMERICAN" Radials also feature easy control, safety and low maintenance.

These machines may also be used economically for spot-facing, trepanning and reaming. Because of their extreme versatility, they can be kept almost constantly on a wide range of productive work.





THE NEW "AMERICAN" HOLE WIZARD

This "Newest of New Radials" features higher speeds, lower drilling costs, less operating effort and minimized maintenance.

Twelve speeds in geometrical progression are provided and cover a standard range of 50 to 1500 r.p.m. By use of pick-off gears, this range may be changed to suit any requirements.

Head is 100% anti-friction and automatically oiled. Spindle is of "Nitrolloy" steel, nitrided for hardness. All gears are hardened and ground. Spindle reverse required for tapping is accomplished by an almost instantaneously reversing motor. All controls are within easy reach of operator.

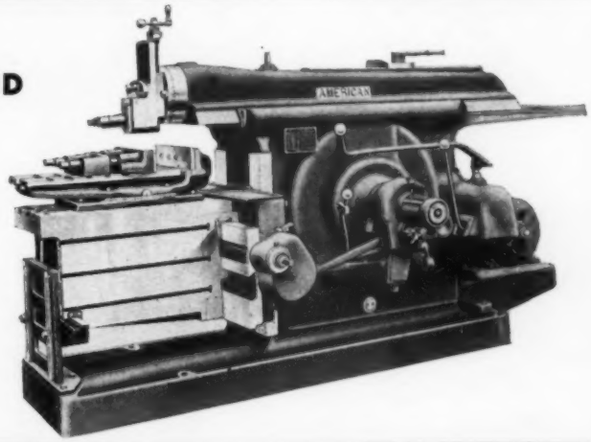
SHAPERS

"AMERICAN" AUTO OILED SHAPERS

These improved machines have approximately 60% greater capacity than shapers ten years old.

In addition to removing metal faster and better, the "AMERICAN" has also proved its ability to handle work at minimum cost.

Among the important features offered in "AMERICAN" Auto-Oiled Shapers are: powerful transmission, anti-friction construction, automatic lubrication, convenience in operation and extreme ruggedness.

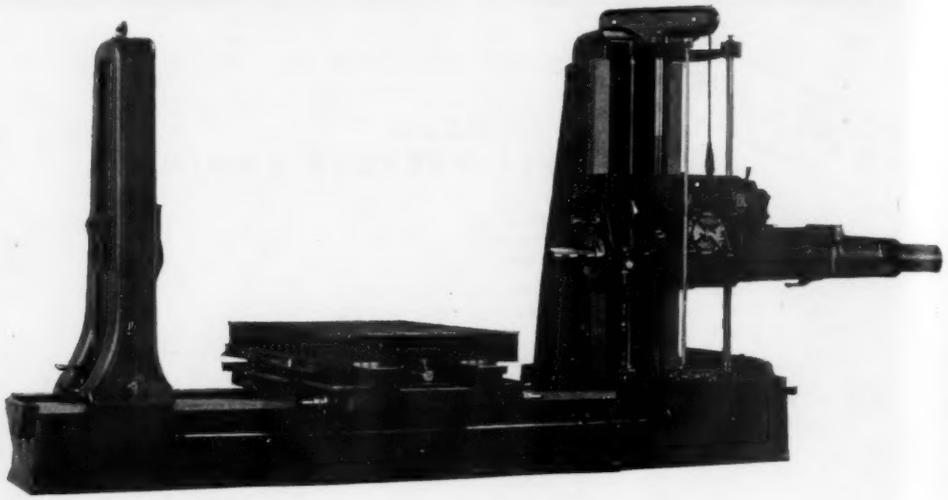


COMPANY CINCINNATI, OHIO, U. S. A.

G&L SEVENTY FIVE YEARS of

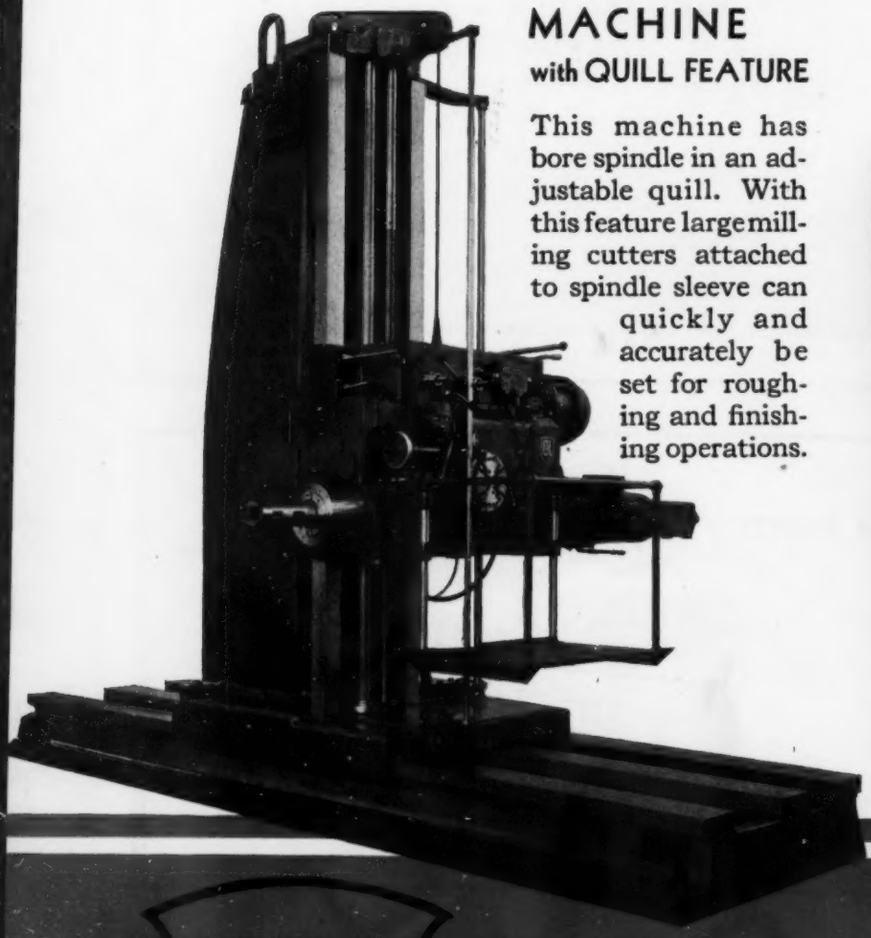
TABLE TYPE MACHINE

Machines with tables having extra long cross travel and carrying heavy loads are provided with saddle supports and auxiliary runways.



FLOOR TYPE MACHINE
with QUILL FEATURE

This machine has bore spindle in an adjustable quill. With this feature large milling cutters attached to spindle sleeve can quickly and accurately be set for roughing and finishing operations.



ONE sure way to appreciate today's art of cutting metal is to visualize the machine tools and practices of three-quarters of a century ago. Since then the Industry has made tremendous strides—and G&L have contributed no small part to these advances . . .

During the past 75 years G&L have characteristically developed exclusive improvements on the High Power Boring, Milling and Drilling

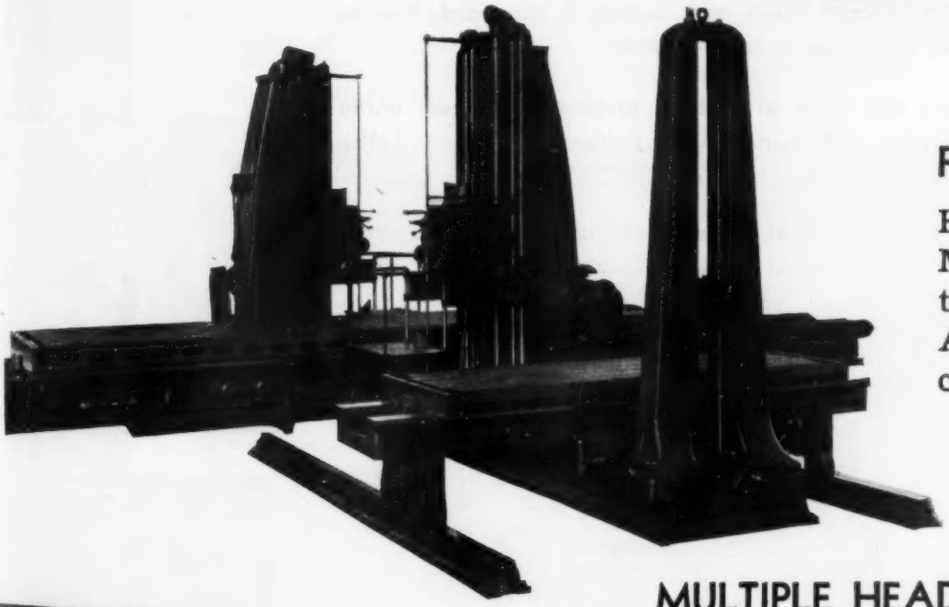
1862 • 1937

GIDDINGS MACHINE

FOND DU LAC

SERVICE to the INDUSTRY

G&L



PLANER TYPE MACHINE

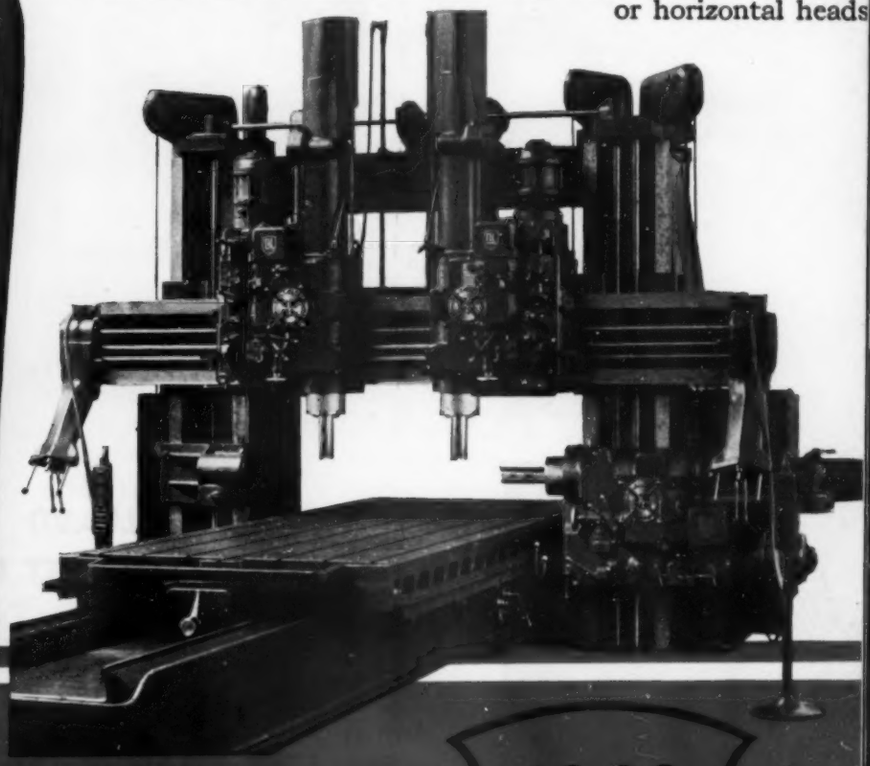
Horizontal Boring, Drilling and Milling Machine of the planer type with adjustable column. Also furnished with stationary column and quill feature.

MULTIPLE HEAD PLANER TYPE MACHINE

Further extending G & L's many boring, drilling and milling machine features to planer-type mills. These machines can be furnished with two, three and four vertical or horizontal heads

Machines. Today the application of these machines to precision work is a simple—though exacting—art under operating conditions that are fast, efficient and exceeded by none.

With 75 years of accumulated experience back of it, every G & L Machine carries a promise of unconditional satisfaction and an assurance of profitable, trouble-free performance.



AND **LEWIS** TOOL COMPANY

WISCONSIN

1862 • 1937

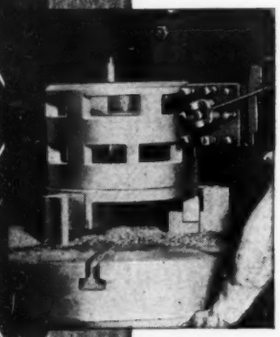
IT ISN'T STRANGE

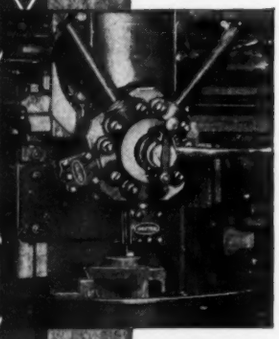
If You Know the Machines

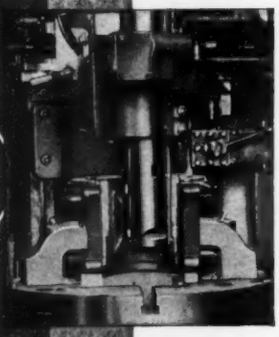
Many users of Bullard Vertical Turret Lathes say that it would cost them real money if they didn't have these machines in their plants.

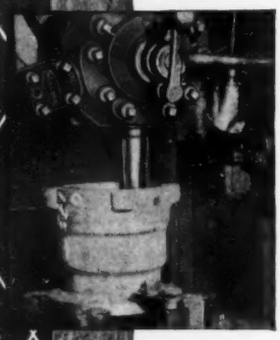
That's why time after time original customers come back for additional Bullard Vertical Turret Lathe equipment. If others can PROFIT, so can you.

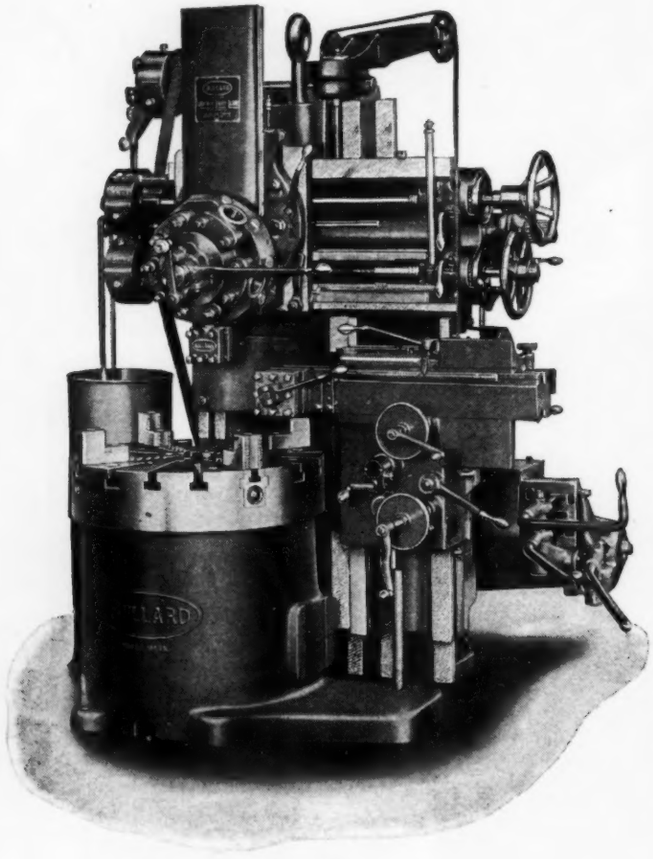
Send for information on these utility manufacturing units in Standard "Spiral Drive" Type and High-Speed "Spiral Drive" Type.

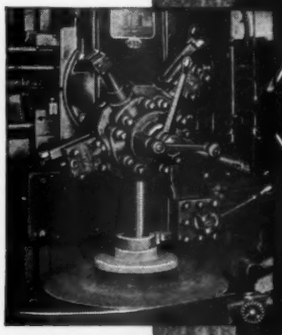


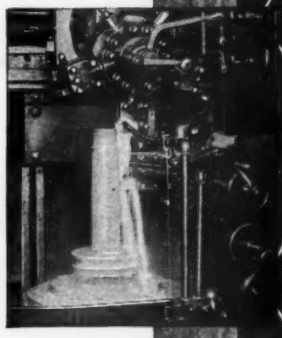


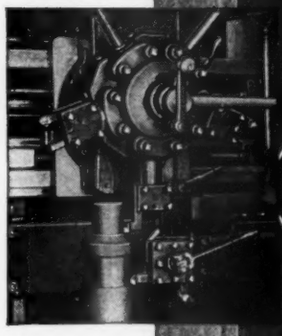


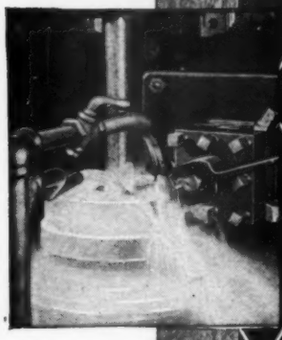












BULLARD

VERTICAL TURRET LATHES

in sizes

24 inch - 36 inch - 42 inch - 54 inch - 64 inch

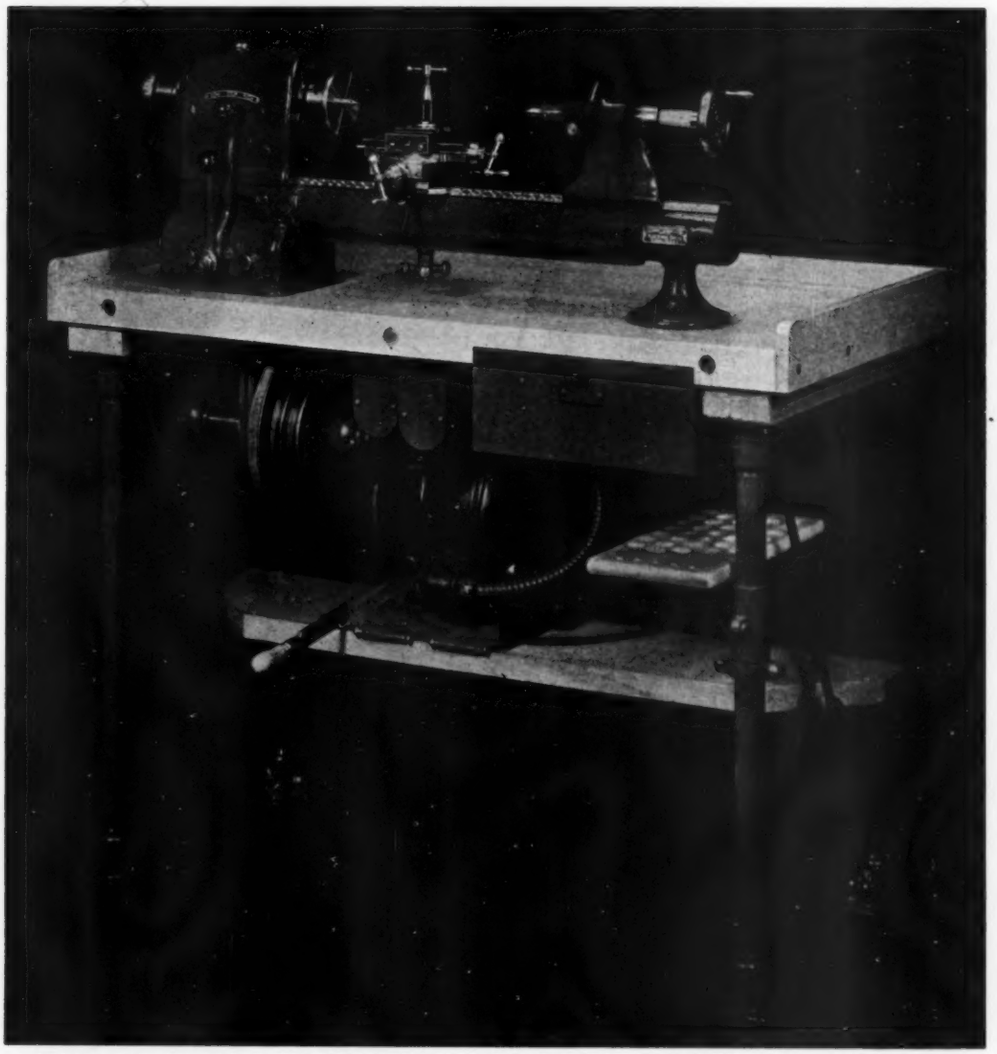
Any of these machines are available with Standard or Special Tooling, a variety of Motor Drives, Thread Cutting Attachment, Drum Scoring Attachment, Fine Feed Attachment, and Cutting Lubricant System.

BRIDGEPORT **THE BULLARD COMPANY** **CONNECTICUT**

Cataract HARDINGE Cataract

PRECISION BENCH LATHE UNIT WITH BALL BEARING SPINDLE CONSTRUCTION

Bench Lathe users are realizing the many advantages of our modern unit illustrated. Skeptical at first, they soon admitted the points of superiority when comparing with equipment used previously. These units are being installed in ever-increasing numbers—*investigate the possibilities.*



HARDINGE "CATARACT" PRECISION BENCH LATHE UNIT WITH PRELOADED BALL BEARINGS

ADVANTAGES

Increased production—extreme accuracy—positively no radial or end play—turns perfectly true pieces—successful constant operation—no adjusting of bearings—spindle not subject to bearing wear—allows use of modern Tungsten Carbide and Diamond Tools—produces excellent finish without polishing—fully enclosed headstock to afford "connected bearing" feature—modern electrical driving unit—high spindle speeds; 230 to 2500 RPM or 230 to 3900 RPM; six or eight speeds forward and reverse—brake for quick stopping of spindle—five sizes: ½ to 1" collet capacity, 7" or 9" swing—rigid construction, smooth performance and long life.

In addition, these machines embody all of the operation and design features of HARDINGE "Cataract" standard Enclosed Head Precision Bench Lathes. Further, they interchange attachments, collets, etc. with our cone and enclosed head model bench lathes now in use.

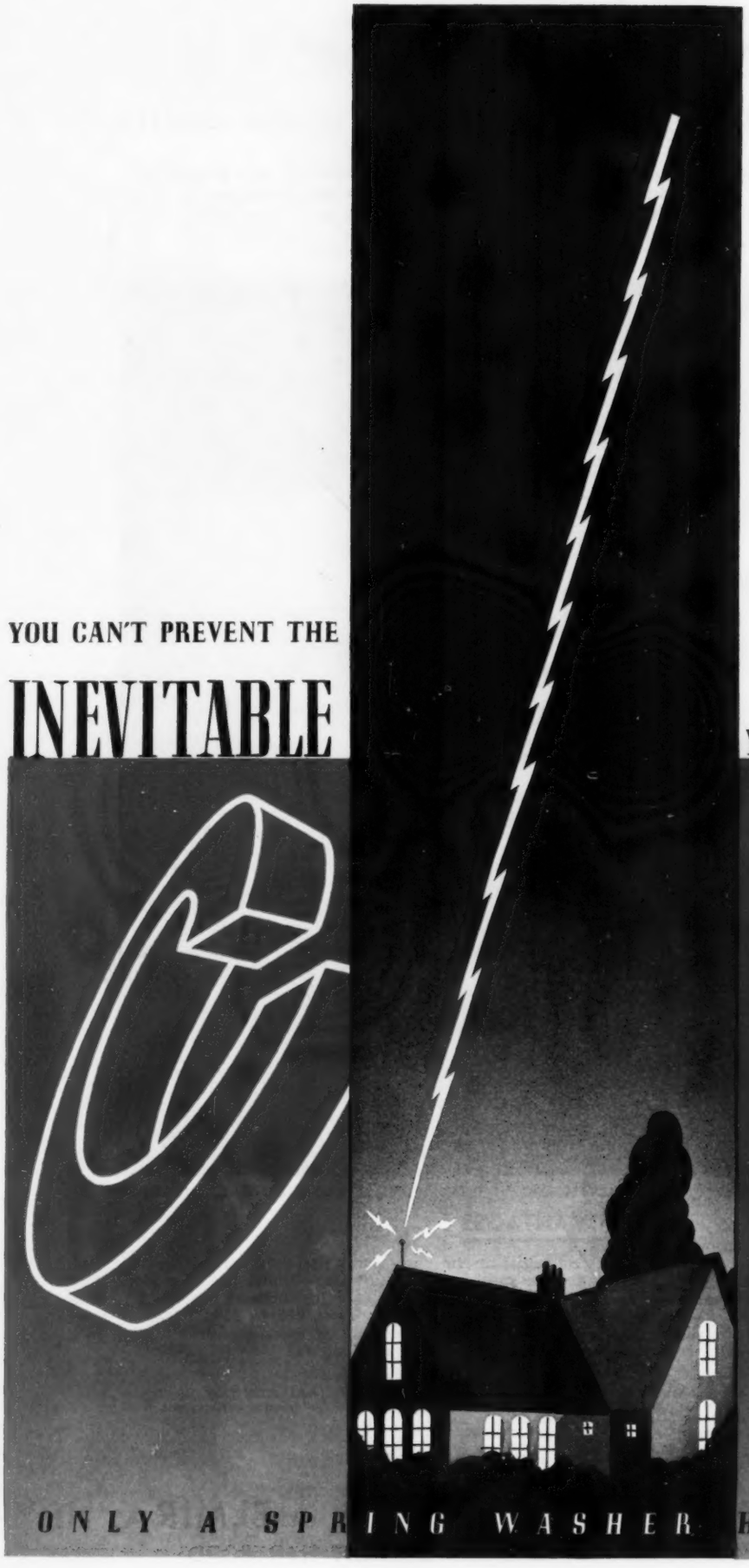
ASK FOR BULLETIN B3 FOR DETAILS ON THIS MODERN UNIT

HARDINGE BROTHERS, INC. + + ELMIRA, N. Y.

CHICAGO-NEW YORK-PHILADELPHIA-DETROIT-HARTFORD

YOU CAN'T PREVENT THE

INEVITABLE



-But

YOU CAN COMBAT IT!

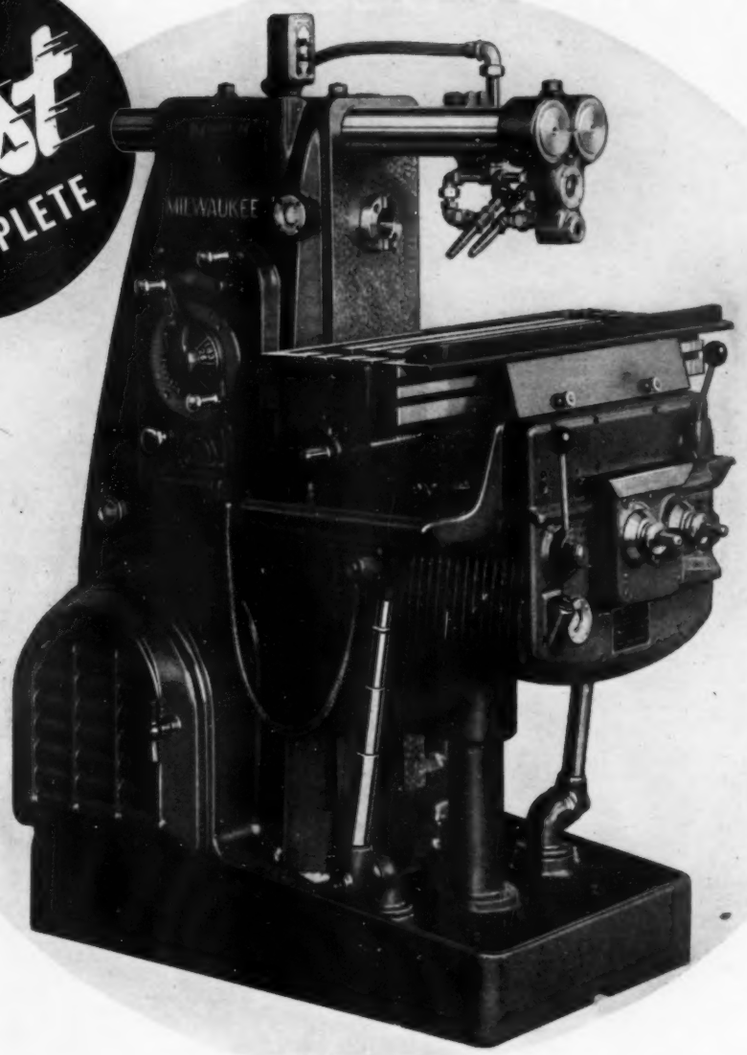
Initial looseness is never caused by a nut or bolt turning backwards upon its threads • Bolts loosen initially because of stretching, wear of parts, minute imperfections in contacting surfaces of assembled parts, and other similar uncontrollable processes • No "locking" device yet created can *prevent* this inevitable looseness. Only a SPRING WASHER has sufficient *range* of *Live Action* to *compensate* for it and keep parts tight. To assemble any bolted construction without Spring Washers is to be satisfied with *less* than full value.

SPRING WASHER INDUSTRY

616 WRIGLEY BUILDING • CHICAGO, ILL.

ONLY A SPRING WASHER HAS *Live Action!*

COMPACT
Fast
COMPLETE



MORE THAN 38 YEARS OF DOING ONE THING WELL

Doing One Thing Well . . . concentrating on the solution of your milling problems . . . established and maintains a world-wide reputation for MILWAUKEE MILLING MACHINES as the finest your money can buy. A typical K & T achievement is this completely automatic Model H Manufacturing Type . . . the machine for milling those small parts, in any quantity . . . at a profit. Model H Machines are also available in Plains, Universals, and Sliding Head Vertical Types, the same as the Model K, the original High-Speed Milling Machine.

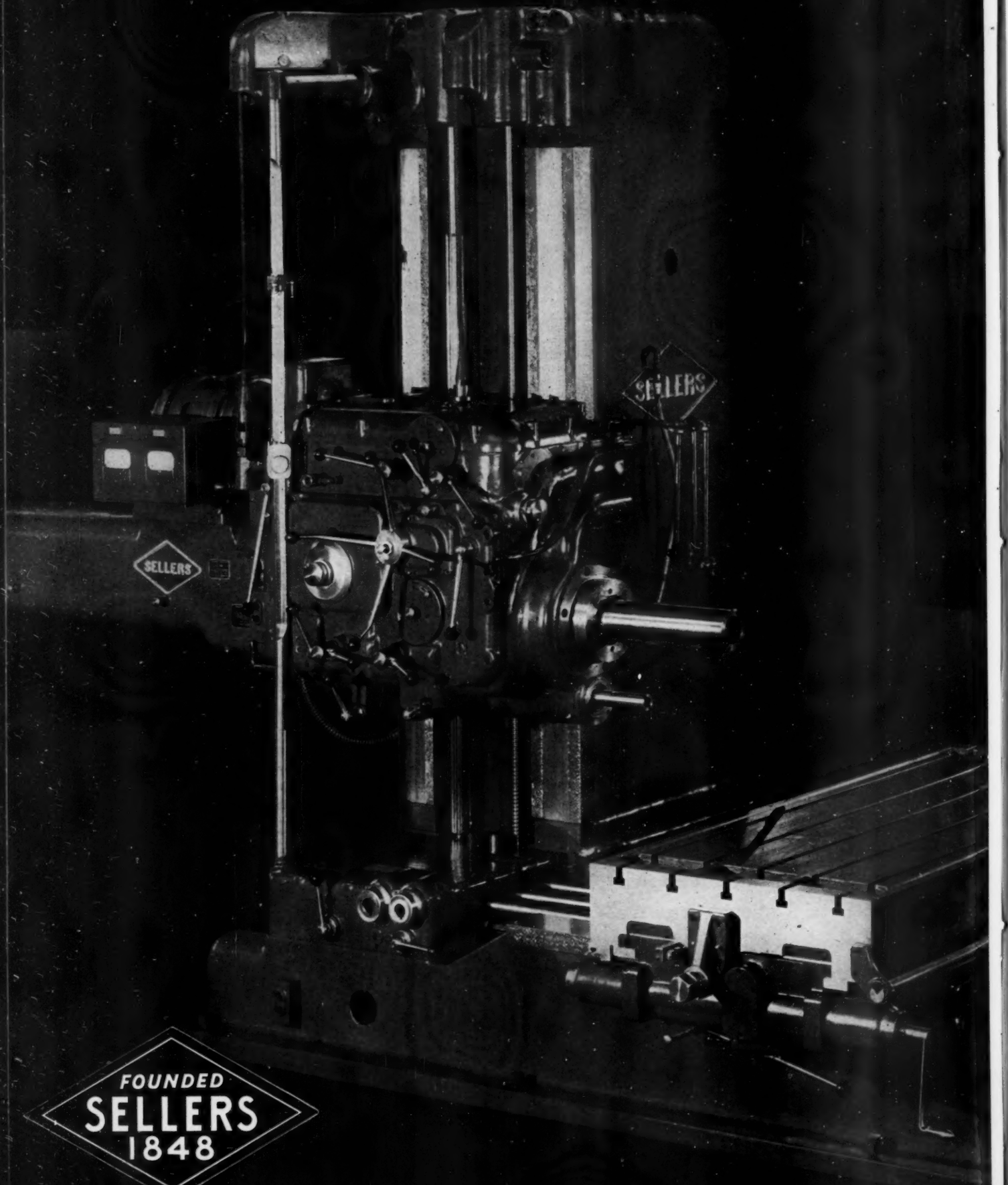
Let K & T specialization be your guarantee.

Write for Bulletins.

K & T MILWAUKEE MILLING MACHINES

KEARNEY & TRECKER CORPORATION
MILWAUKEE
WISCONSIN

OUTSTANDING SIMPLICITY •



FOUNDED
SELLERS
1848

FLEXIBILITY • CONVENIENCE •

SELLERS HORIZONTAL

Boring, Drilling *and* Milling Machines

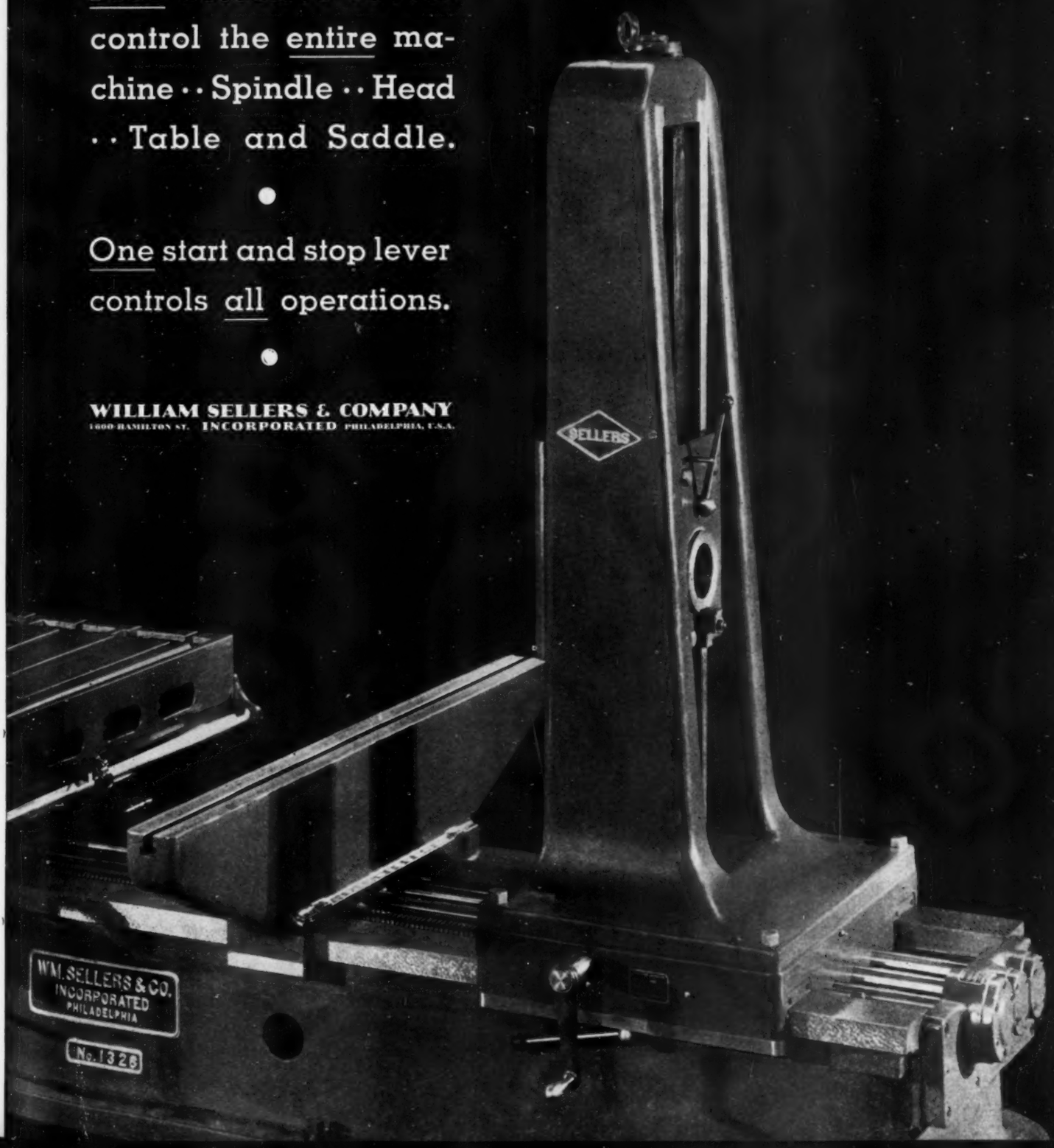
Four selective levers control the entire machine · · Spindle · · Head · · Table and Saddle.

•

One start and stop lever controls all operations.

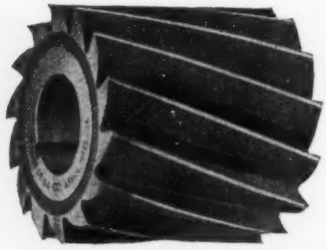
•

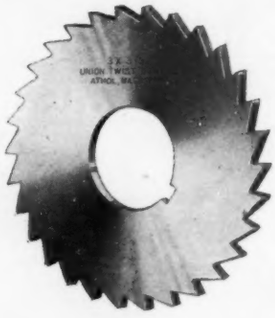
WILLIAM SELLERS & COMPANY
1600 HAMILTON ST. INCORPORATED PHILADELPHIA, U.S.A.

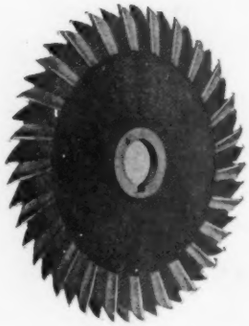


UNI

MILLING CUTTERS | GEAR CUTTERS | SLITTING SAWS







"The Tools

THE cutting tools used on a modern production machine in the course of a year represent quite a percentage of the cost of the machine itself.

You select your machines with careful reference to the work required, and the results expected. Do you use the same care in the selection of your cutting tools?

UNION TWIST DRILL COMPANY,

NEW YORK STORE: 62 Reade Street CHICAGO STORE: 11 South Clinton Street DETROIT STORE: 6540 Antoine Street

SAN FRANCISCO STORE: 121 Second Street LOS ANGELES STORE: 168 So. Central Ave.

THE COMPLETE Line of MODERN CUTTING TOOLS

END MILLS

TWIST DRILLS

REAMERS

You Buy Again"

Within the range indicated by the accompanying illustrations we probably manufacture and carry in stock a greater variety of modern cutting tools than can be secured from any other source. In addition, through our CARD and BUTTERFIELD divisions, we produce a complete line of taps, dies, screw plates, etc.

When special tools must be made we give prompt, efficient service at lowest cost.

ATHOL, MASSACHUSETTS, U. S. A.

BUTTERFIELD DIVISION: Derby Line, Vt., and Rock Island, Quebec

S. W. CARD MFG. CO. DIVISION: Mansfield, Mass.

REPRESENTATIVES THROUGHOUT THE WORLD

For low costs

more than corrosion resistance

Licensee of Chemical Foundation, Inc.

Carpenter

all along the line

MAKE IT OF
CARPENTER STAINLESS STRIP

From the press room straight through to the finishing department, you can trace Stainless savings to this strip. With it you can afford to use Stainless Steel more freely in making product improvements.

Intricate shapes and high precision are more easily obtained with its uniform temper and absence of hard spots.

The slightly slower press speeds advisable with Stainless Steel are more than offset with Carpenter Stainless Strip by the time saved in the buffing room.

For low costs all along the line--for parts that you are about to swing to Stainless--even for those jobs that have proved too difficult for other Stainless Steels--test this easier-to-work strip. There is a type for every purpose and the Carpenter representative will help you select the type that will serve you best.

The Carpenter Steel Company, Reading, Pa.

SAVINGS IN THE BUFFING ROOM

The satin smooth surface of Carpenter Stainless Strip is helping many Stainless users to save money. It makes it easy to get the exact finish you want with a minimum of time and labor in the buffing room.

This Stainless Strip lends itself equally well to the new, modern "butler" finish or to the ever popular mirror finish.

In many cases, stampings made from Carpenter Stainless Strip require no wheels to prepare the surface for buffing. When polishing is necessary, use set-up wheels with the best grade of Turkish emery. The last operation before buffing can be a greaseless compound on a loose buff. Wheel speed 12,000 to 15,000 surface feet per minute.

For buffing, use a fairly hard bleached buff--or a triplex buff. Speed 12,000 to 15,000 surface feet per minute.

Special Stainless buffing compounds must be used. Avoid red rouge or rose tripoli-- both contain iron oxide which spoils the corrosion resistance of the surface. Paste compounds are being extensively used on automatic buffing machines.

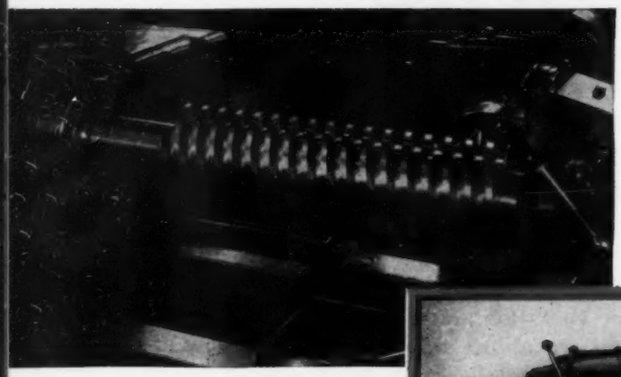
For additional information and data to help you lower your cost of handling Stainless, we invite you to consult your Carpenter representative. He is prepared to advise you on the newest and best procedure, apparatus and materials.

STAINLESS STEELS

For 76 years ACCURACY

FOR MACHINE

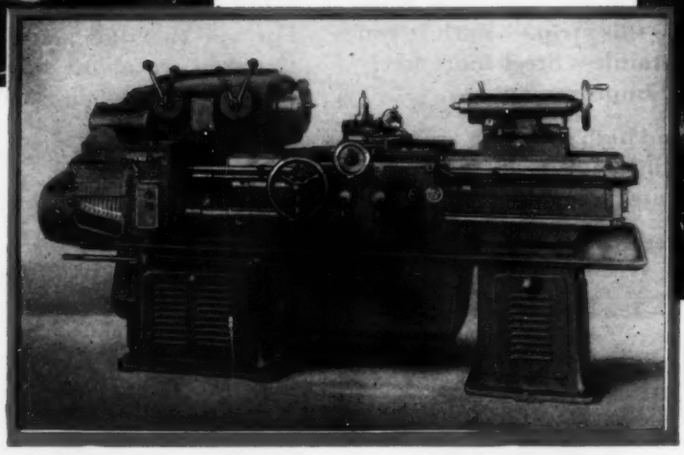
"There is no better paying investment than the right tools for the job."



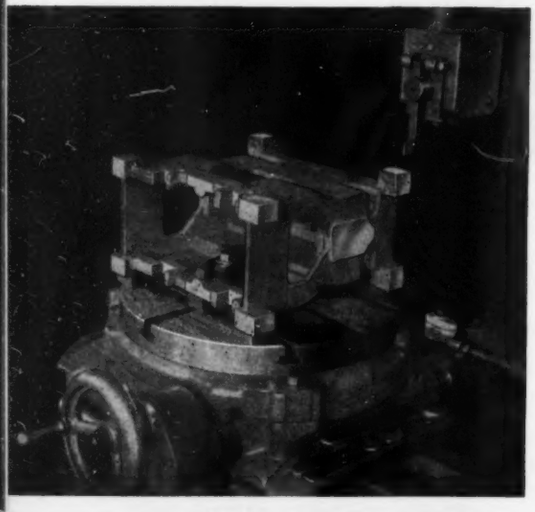
Above: Pratt & Whitney Thread Millers are available in three sizes, 4½", 6" and 10", and in varying lengths of bed. Complete information and literature are available.

• • •

Below: Pratt & Whitney Vertical Shapers are rightly called "the handiest machines in the shop". They are available in two sizes, 6" and 12". Ask for complete literature.



Above: Because of Pratt & Whitney developments in gear grinding it now is possible to produce accurate ground gears at a cost comparable with ordinary gears. Ground gears have many advantages that it will pay you to investigate. Ask for complete literature.



Above: Pratt & Whitney 12 inch Model "B" Lathes and 14 and 16-inch Model "C" Lathes, all with the Cam-Lock Spindle Nose, are the finest of accurate tool room equipment —the standard by which all fine lathes are judged. Complete literature is available.

• • •

Right: P&W Jig Borers, a necessity in any tool room, are available in three sizes. They are capable of the finest precision boring and jig eliminating. They use the basic principle of measuring which insures continued accuracy even after years of use. Complete literature is available.

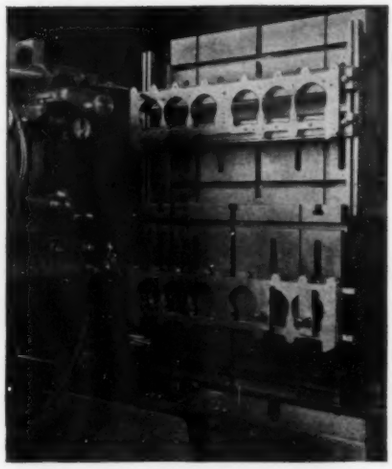
• • •

Left: P&W Hydraulic Vertical Surface Grinders are in wide use finishing all sorts of work. They are capable of fine accuracy at high table speeds. They are built with 8", 14", 22", 26" and 30" wheels. Ask for information.

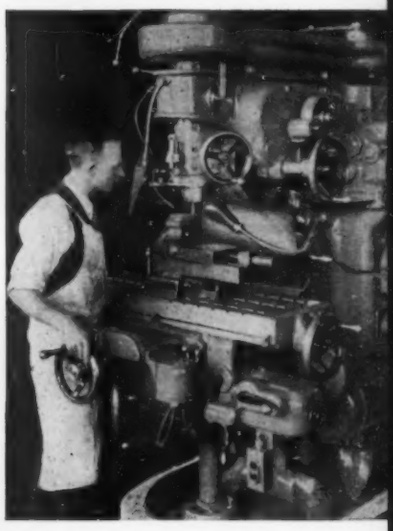
HEADQUARTERS!

TOOLS

The manufacture of machine tools, the basic tools of industry, involves a continuous devotion to accuracy. The care we use in every step is something that always amazes our visitors. It must be seen to be properly appreciated. Visit us at Hartford and let us show you first-hand what must go into a fine piece of equipment if it is to function properly and with accuracy.



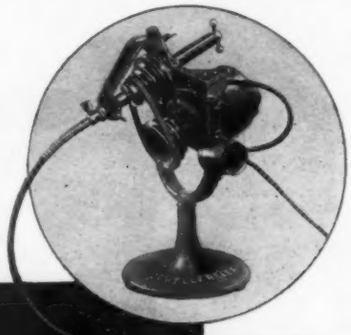
Above: The Keller Automatic Tool Room Machine reproduces automatically and accurately in tough metal the shape of a master made of wood, plaster, soft metal or any other easily worked material. This is the ideal way to produce dies and many other intricate shapes and cavities.

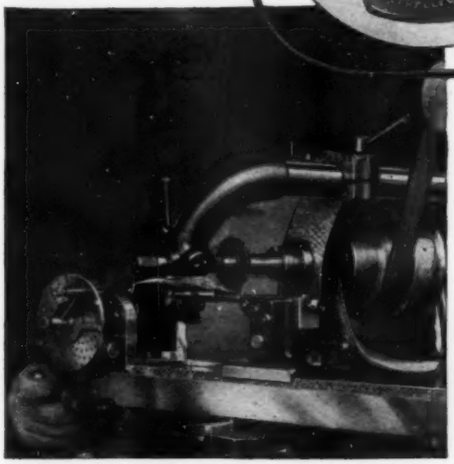


This is the P&W Universal Die Sinker that ha reduced the cost of die cutting up to 75%. Every die shop should have complete literature.

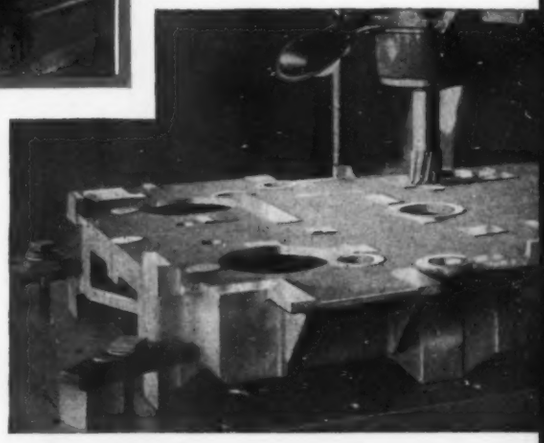
• • •

Right: Kellerflex means a complete line of flexible shaft machines for every purpose, and a complete line of accessories for them, all built with Pratt & Whitney precision.





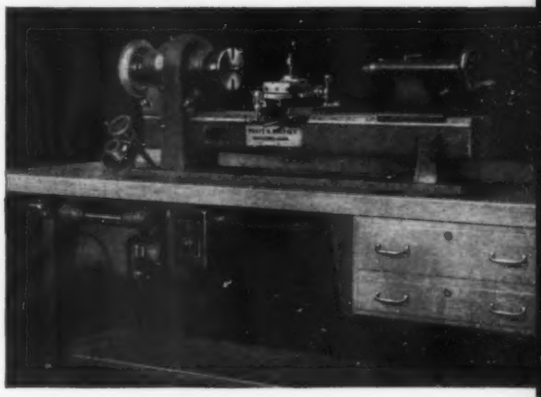
Above: This is one of the larger sizes of Keller machines cutting a typical automotive body die. Ask for information.



• • •

Right: P&W Profilers are well known and have solved many a difficult forming job. They are equally valuable for vertical milling as shown here. Literature is available.

• • •



P&W Bench Machine Tool Equipment is widely used for making small accurate parts. This equipment releases larger machines for more suitable work. At the left is the P&W No. 3 Universal Bench Miller, a duplicate except for size of the big machines, and capable of the finest precision. At the right is the new P&W 10" Bench Lathe driven by the New Departure Transitorq. Combinations of machines on suitable benches are available. It will pay you to investigate this modern equipment for your small work.

PRATT & WHITNEY DIVISION

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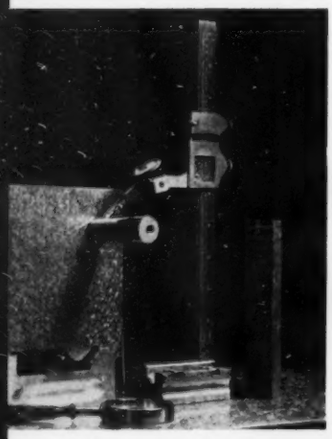
For 76 years ACCURACY

GAGES



P&W Precision Gage Blocks, accurate to millionths, are available in two styles, Hoke and U. S. A., and in several convenient sets to suit individual needs. Sizes range from .010" to 20".

• • •

85E Set of U.S.A. Blocks

85E Set of Hoke Blocks

P&W Thread Gages are hardened, ground, and then lapped to produce their final accuracy and long lived finish. Regularly furnished to A.G.D. standards, or made to order for special cases.

Right: P&W Cylindrical Gages are made of the finest materials, heat treated to almost file hardness, and machine lapped. They can be furnished chromium plated if desired.

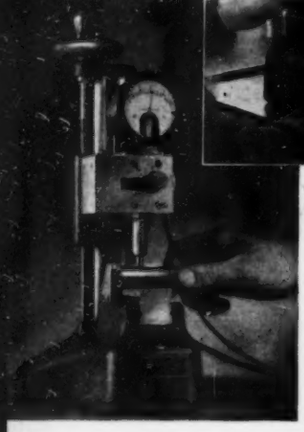
• • •

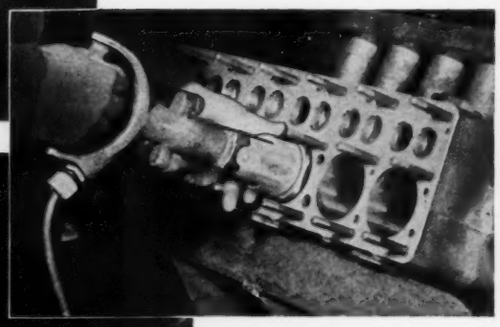
Below: Electrolimit Gages check and grade wrist pins at 700 per hour.

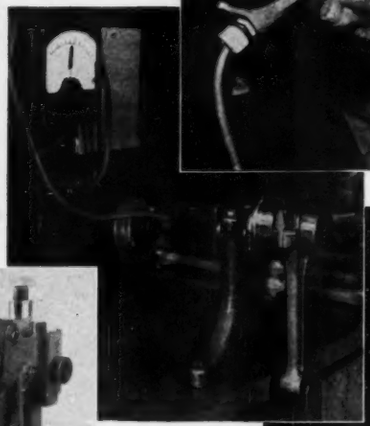
Left: Checking the outside diameter of automobile pistons and grading them for selective assembly, using the P&W Electrolimit Gage.

• • • • •

Below: P&W Electrolimit Cylinder Bore Gages measure and grade for selective assembly the bores in automotive cylinder blocks.



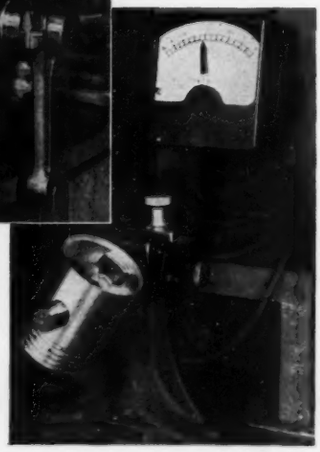




P&W John-Sons Roll Thread Snap Gages analyze threads right at the machine and prevent scrap losses. They reveal the exact nature of errors clearly and quickly.

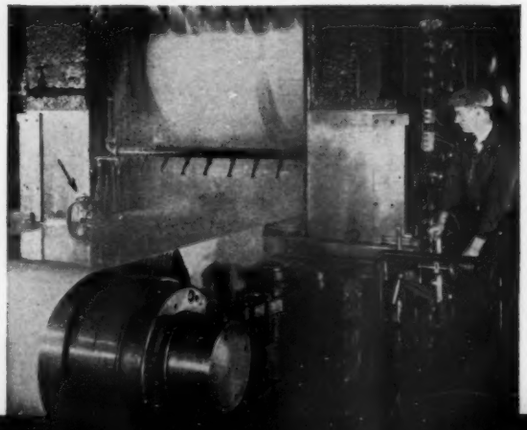
• • • • •

Below: P&W Electrolimit Continuous Gaging Equipment has increased strip mill speeds from 200 feet per minute to a thousand feet or more. Ask for complete information.



Left: Electrolimit Internal Gage checking and grading a connecting rod wrist pin hole.

• • •



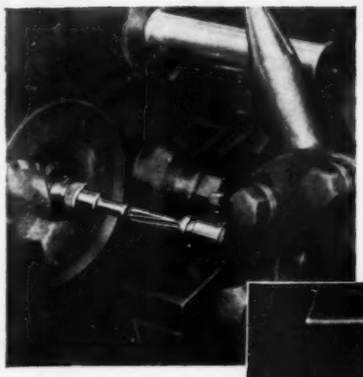
Left: The P&W Standard Measuring Machine is accurate to .00001"—a Bureau of Standards in your own plant. Ask for complete information.

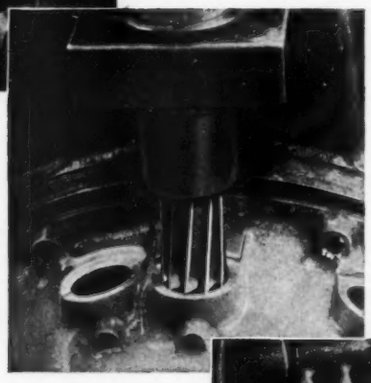
Above: P&W Electrolimit Internal Comparator checking and grading the wrist pin hole in automotive pistons for selective assembly.

HEADQUARTERS!

SMALL TOOLS

Pratt & Whitney make almost every type of cutting tool. Space here will not permit a complete listing. On this page is a brief presentation of the newest P&W achievements in small tool manufacture.





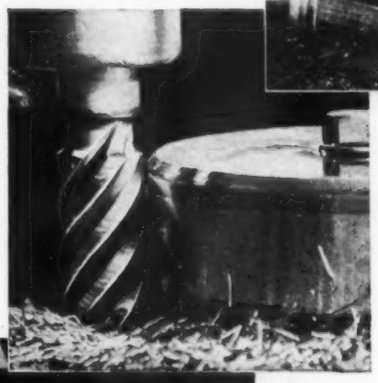
Above: P&W Stub Screw Machine Reamers provide the decimal sizes so necessary in accurate production where close fitting is needed. They are economical tools capable of excellent performance and long life.

• • •

Left: Reaming valve rod holes in a duralumin casting using P&W "Blue-Helix" Reamers —available in decimal sizes.

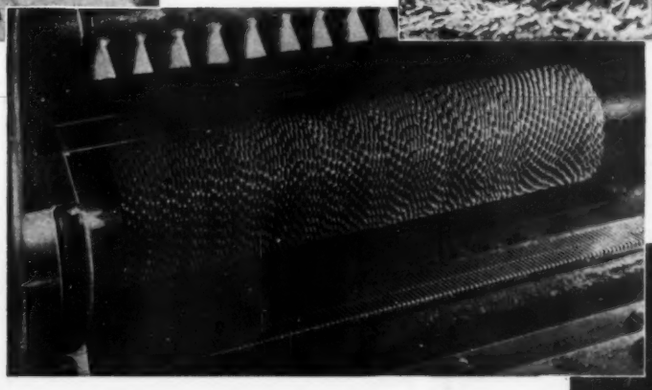
• • •

Right: Profile milling in heat treated high alloy steel 315 Brinnell. P&W milling cutters include all kinds.



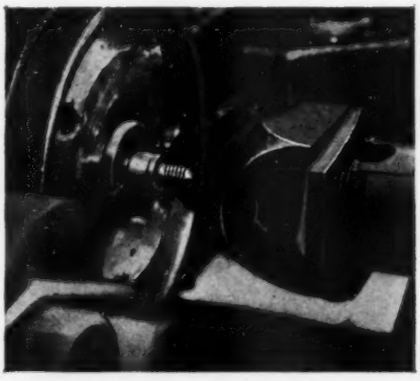
Above: P&W Die Sinking Cutters are designed for use at high spindle speeds, working in tough die steels. They have cutting characteristics that are amazing. Ask for literature.

• • •

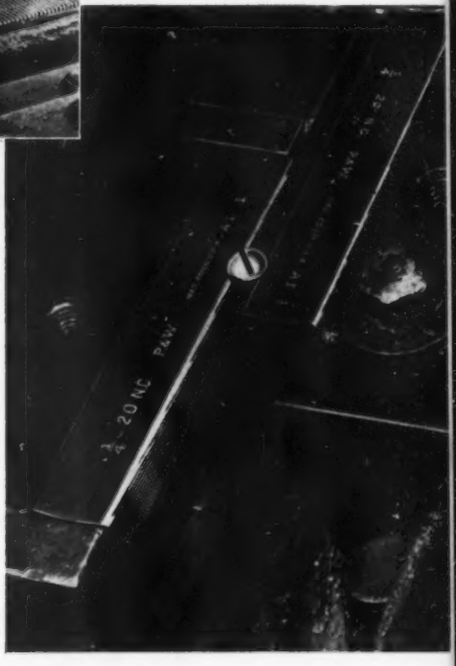


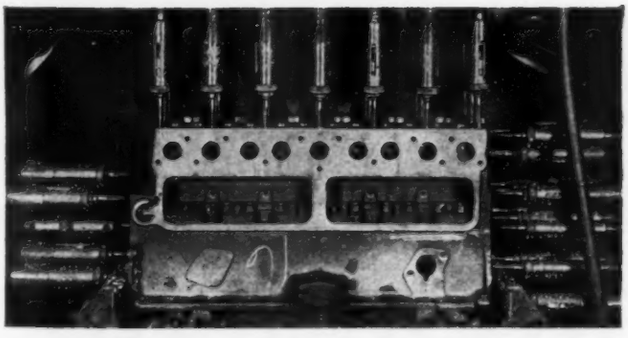
Below: The Duocone Die is so designed that fine accurate adjustment is possible, and at the same time is very simple to regrind. It produces smooth, accurate threads at fairly high speeds.

Below: The excellent records made by P&W Thread Rolling Dies are the result of careful design, material selection, and accurate heat treatment, characteristics of every P&W small tool. One pair of these dies produced over 14 million threads!



Above is an interesting application of P&W Saws, gang mounted to mill the slots in a typewriter spacing bar. P&W Saws and Slitters are available in all styles, and for doing all kinds of work. Ask for complete information.





• • • • •

Left: A three-way Natco tapping machine using 43 P&W taps simultaneously. P&W taps include all kinds, from the smallest to the largest, and all sizes in between. Have you a copy of our Small Tool Catalog?

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workers ARE TOO SCARCE TO *GAMBLE* WITH THEIR *Eyes...*

Give them AO Goggles

It takes *years* to develop a man's skill. But in a *split-second* a chip can pierce an eye, turn a skilled worker into just another "hand", cost you hundreds, perhaps thousands of dollars in compensation, upset production, other expenses.

Take no chances with any of your workers. Make sure they wear AO goggles on every job where there is even the slightest possibility of an eye injury.

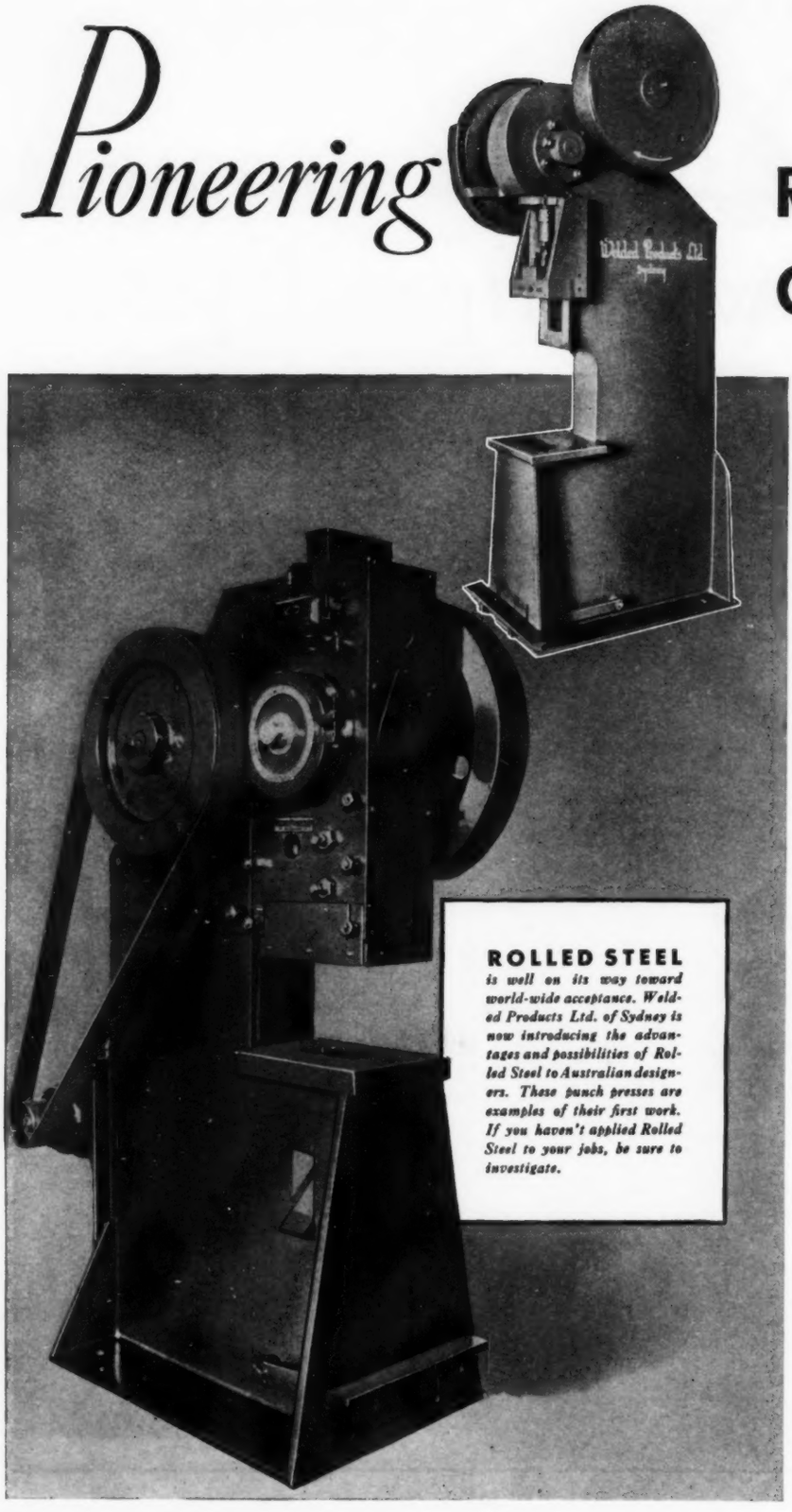
American Optical Company can help you. It has developed a complete line of cool, comfortable goggles for every known eye hazard . . . and offers the services of trained industrial representatives who will work with you to put an economical eye safety program into effect. Write your nearest branch office for an AO man to call.

The F-3100 Ful-Vue Goggle (patented) provides workers all-day-long comfort. High-up endpieces give unobstructed vision at the sides. Self-adjusting nose pieces fit themselves comfortably to the sides of the nose. 6-Curve Super Armorplate Lenses offer greater resistance than lenses used in standard safety goggles.

Company

Manufacturers, for more than 100 years, of products to aid and preserve vision. Factories at Southbridge, Massachusetts. In Canada, Consolidated Optical Co., Ltd. Branch offices in all principal industrial centers

Pioneering ROLLED STEEL CONSTRUCTION *In Australia*



ROLLED STEEL
is well on its way toward world-wide acceptance. Welded Products Ltd. of Sydney is now introducing the advantages and possibilities of Rolled Steel to Australian designers. These punch presses are examples of their first work. If you haven't applied Rolled Steel to your jobs, be sure to investigate.

ONLY a few years ago Rolled Steel for machine construction was a "newfangled" idea in this country. Slowly at first, and then ever more rapidly, machine designers accepted Rolled Steel and adapted it to their problems.

Today Rolled Steel is serving this same period of apprenticeship in Australia. Welded Products Ltd. of Sydney is now introducing the advantages and possibilities of Rolled Steel to Australian designers. There, as here, Rolled Steel is finding ready acceptance.

For machine designers everywhere appreciate the freedom from old restrictions, the faster production and faster deliveries made possible by Rolled Steel. It saves time and money by eliminating patterns, particularly when only a few machines are to be built. It gives designers known factors of strength to deal with. Stiffening and wearing members can be placed where needed. Excess weight and bulk can be discarded. Production costs cut. Time required for machining reduced. Costs of cutting tools lowered.

Investigate this modern manufacturing process. See for yourself how it produces a higher quality job at lower cost than any method hitherto employed. Write today for your free copy of "Rolled Steel for Machine Construction."

CARNEGIE-ILLINOIS STEEL CORPORATION · *Pittsburgh and Chicago*
COLUMBIA STEEL COMPANY · *San Francisco*
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Columbia Steel Company, San Francisco, *Pacific Coast Distributors* · United States Steel Products Company, New York, *Export Distributors*

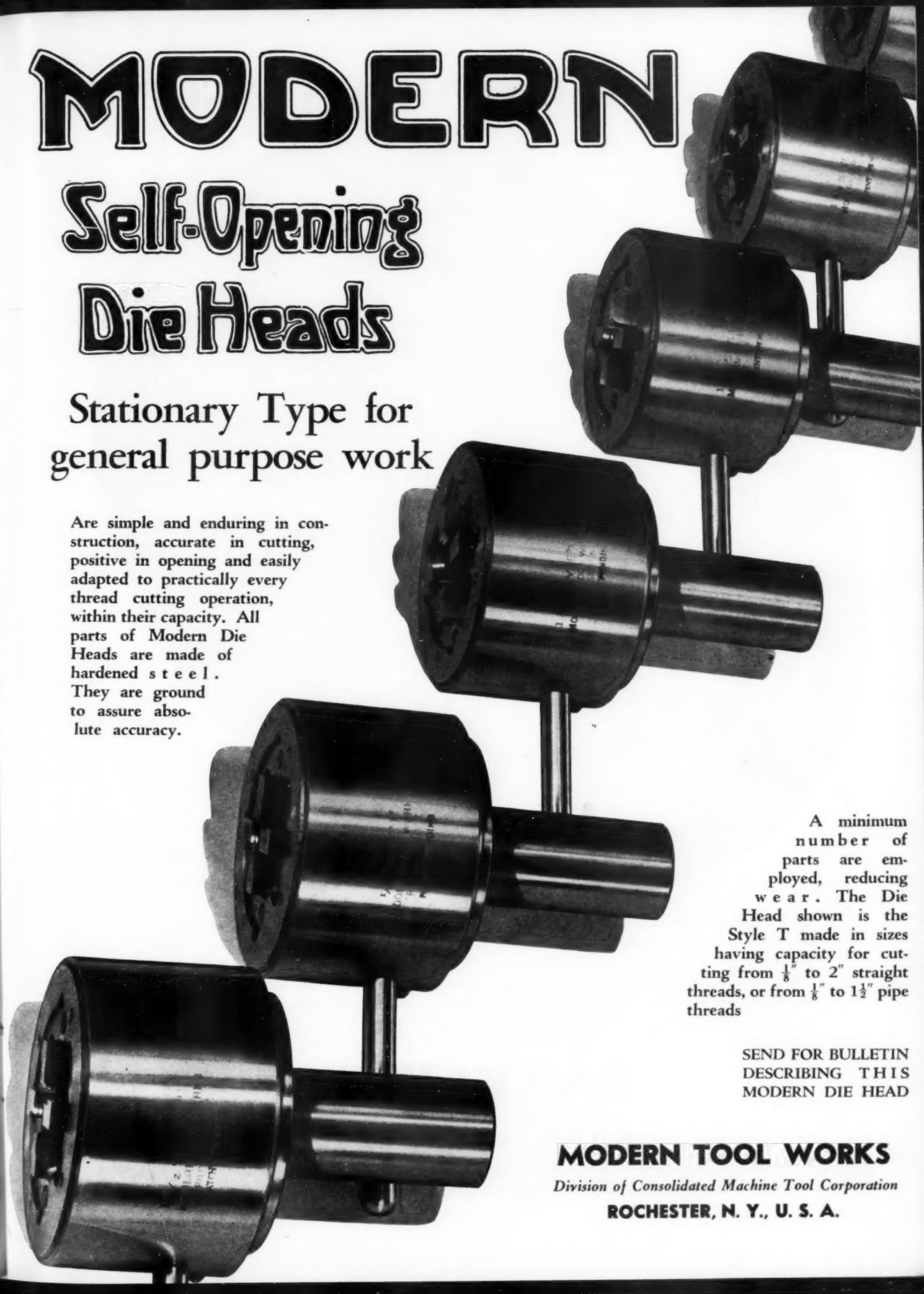
UNITED STATES STEEL

MODERN

Self-Opening Die Heads

Stationary Type for general purpose work

Are simple and enduring in construction, accurate in cutting, positive in opening and easily adapted to practically every thread cutting operation, within their capacity. All parts of Modern Die Heads are made of hardened steel. They are ground to assure absolute accuracy.



A minimum number of parts are employed, reducing wear. The Die Head shown is the Style T made in sizes having capacity for cutting from $\frac{1}{8}$" to 2" straight threads, or from $\frac{1}{8}$" to $1\frac{1}{2}$" pipe threads

SEND FOR BULLETIN DESCRIBING THIS MODERN DIE HEAD

MODERN TOOL WORKS

Division of Consolidated Machine Tool Corporation

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FASTER SMALL-PARTS SNAGGING

IN LEADING automobile plants, abrasive wheels *speed*-bonded with Bakelite Resinoid have increased production and cut costs in snagging small as well as large castings of many kinds. A typical process is pictured. Strong, heat-resistant, cool-running . . . Bakelite Resinoid bonded wheels operate efficiently up to 9500 s.f.p.m. for snagging. Write for our informative handbook 14G, "High Speed Abrasive Wheels".

BAKELITE CORPORATION, 247 PARK AVENUE, NEW YORK, N.Y.
BAKELITE CORPORATION OF CANADA, LTD., 163 Dufferin Street, Toronto, Ont.

BAKELITE

The registered trade marks shown above distinguish materials manufactured by Bakelite Corporation. Under the capital "B" in the symbol, numerical age for infinite, or unlimited quantity, it symbolizes the infinite number of present and future uses of Bakelite Corporation's products.

BONDED WHEELS

FOR ECONOMICAL HIGH SPEED GRINDING

In 2 short months

FROM OCTOBER 23 to DECEMBER 23

HOLDEN

Hy-Speed Case

Registers a Smash hit!

FIRST INTRODUCED—

October 23, 1936 at the Metal Congress at Cleveland. A product of Holden Research. The result of 700 experiments. Used in producing secondary Hardness on High-Speed Tools.

NOW USED BY—

15 Small Tool Manufacturers.
6 Motor Car Manufacturers.
2 Prominent Brass Companies.
30 Miscellaneous Manufacturers.

TYPICAL RESULTS—

Life of tools used for machining S.A.E. 1045 steel, INCREASED 150 per cent *in a large motor plant.*

Life of dies for drawing brass—INCREASED 200 per cent—*improved finish with* NO *scoring.*

Life of a forming tool—INCREASED 5 Times former life and still running.

IF YOU ARE INTERESTED—

The life of YOUR High-Speed Tools can be *increased* from 100 per cent to 500 per cent, provided you cooperate with Holden Research.

We will prove it by treating one specific tool for a definite application.

TIE this TAG to a TOOL
with the following informdtion

(1) Use of tool.....
(2) Speed of cut.....
(3) Material to be machined—Ferrous or Non-Ferrous
.....
(4) Brinnell or Rockwell Hardness.....
Your name and address.....
.....

AA-188

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New Haven, Conn.

To Buyers of Machine Tools . . . .

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Milling Machines . . . .

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SHARPE

•ALL INDUS
ACQUAINT IT
LANDIS PRECI

WE lack the space to give you the essential facts about the large number of modern Landis precision grinders. You would probably lack the time to study such a presentation even if we did make it.

To simplify the matter all around, we are picturing here ten representative machines. *Look at them.* Aren't they sturdy looking pieces of equipment? They are and they can be depended upon to go into cost reducing action in your plant—if you give them a chance. You have many to choose from. *For example.*

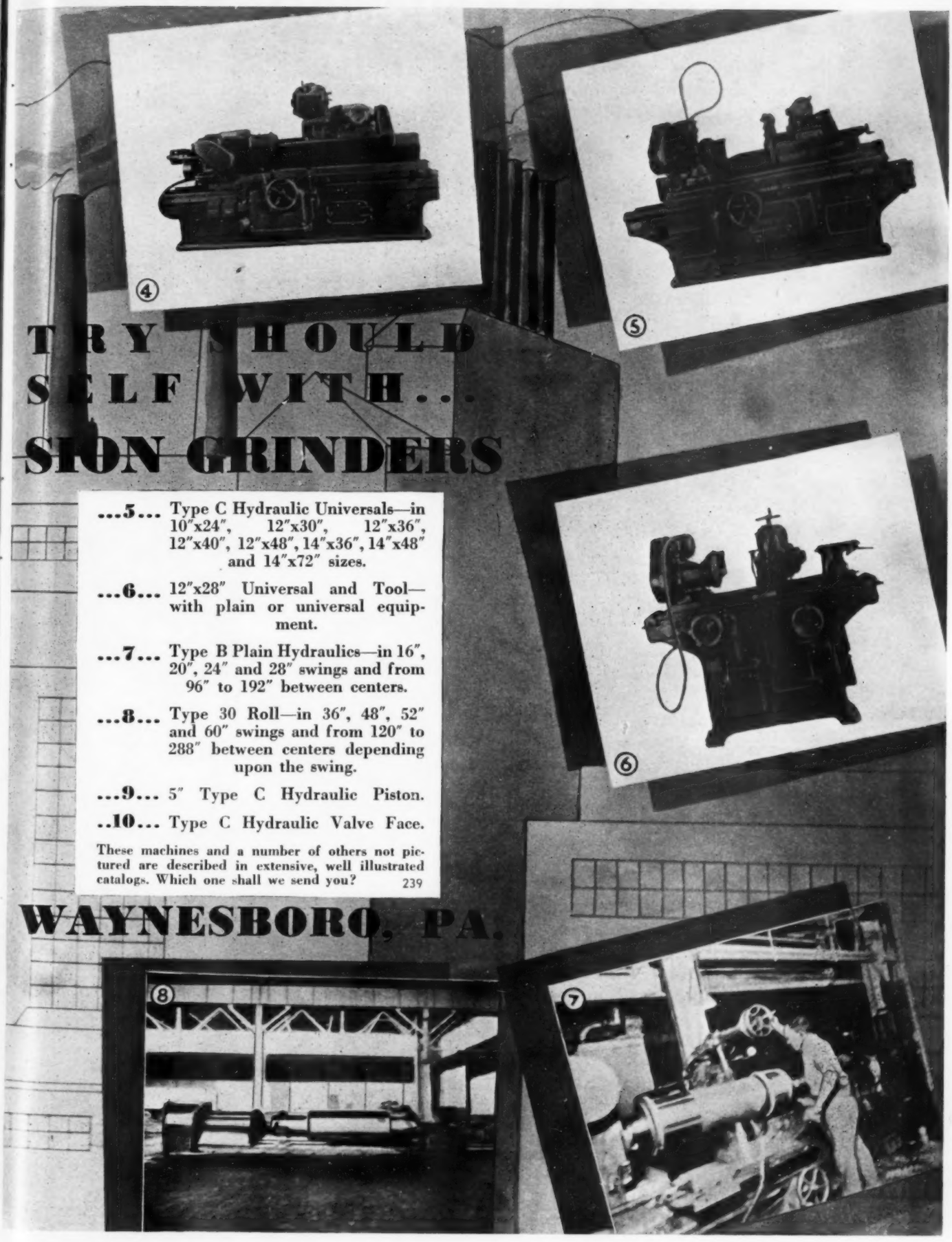
...1... Type C Plain Hydraulics—in 6″x18″, 6″x30″, 10″x18″, 10″x36″, 10″x48″ and 10″x72″ sizes.

...2... Type D Plain Hydraulics—in 10″, 14″ and 16″ swings and from 18″ to 72″ between centers.

...3... Type D Hydraulic Crank—in 10″x16″, 10″x34″, 16″x32″, 16″x42″ and 16″x72″ sizes.

...4... Type D Hydraulic Cam: in 5″x26″, 5″x30″, 5″x36″, and 5″x40″ sizes.

LANDIS TOOL CO.



TRY SHOULD SELF WITH...
SION GRINDERS

...5... Type C Hydraulic Universals—in 10″x24″, 12″x30″, 12″x36″, 12″x40″, 12″x48″, 14″x36″, 14″x48″ and 14″x72″ sizes.

...6... 12″x28″ Universal and Tool—with plain or universal equipment.

...7... Type B Plain Hydraulics—in 16″, 20″, 24″ and 28″ swings and from 96″ to 192″ between centers.

...8... Type 30 Roll—in 36″, 48″, 52″ and 60″ swings and from 120″ to 288″ between centers depending upon the swing.

...9... 5″ Type C Hydraulic Piston.

..10... Type C Hydraulic Valve Face.

These machines and a number of others not pictured are described in extensive, well illustrated catalogs. Which one shall we send you? 239

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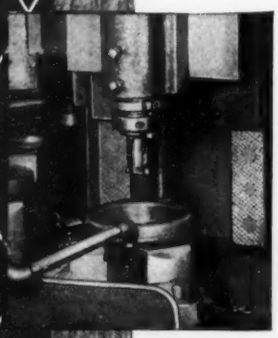
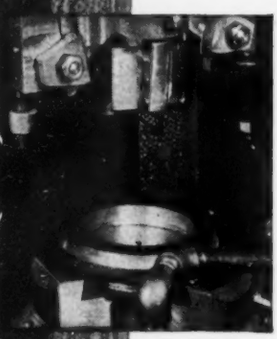
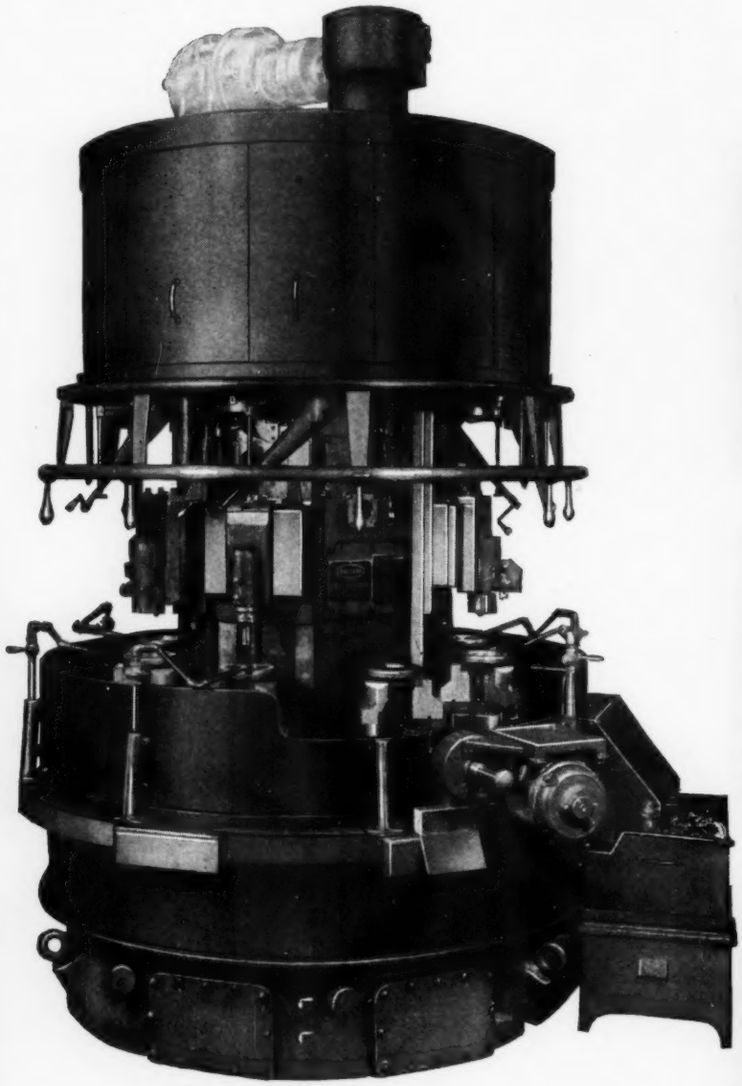
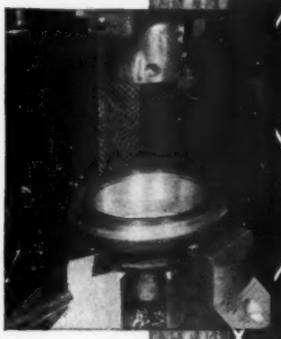
YOUR 1937 PRODUCTION—?!

If it's VOLUME you need or if it's added Efficiency and Economy—or maybe if it's these things combined PLUS—then, think of the Mult-Au-Matic Method.









Mult-Au-Matics are available in Types and Sizes to meet the requirements of work sizes, work volume, and also the requirements of quick return on the investment.

Multiple tooling at 5 or 7 stations provides an effective means of lowering manufacturing costs.

MULT-AU-MATICS

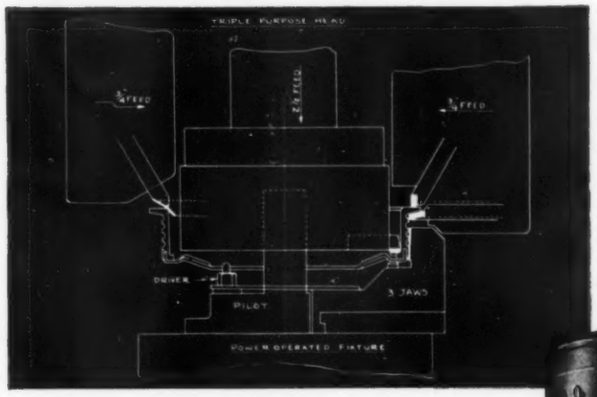
Type	Size	Spindles
"D"	8"	6 and 8
"D"	12"	6 and 8
"D"	16"	6 and 8
"J"	7"	8
"J"	11"	8

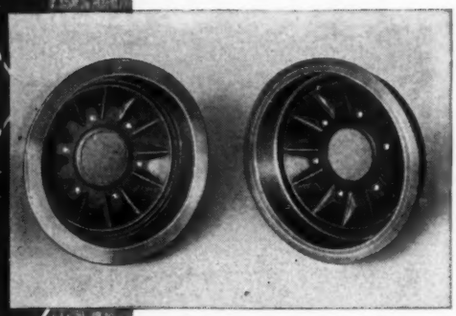
Send your requirements to Bullard Engineers and let them submit Estimates for your study and comparison.

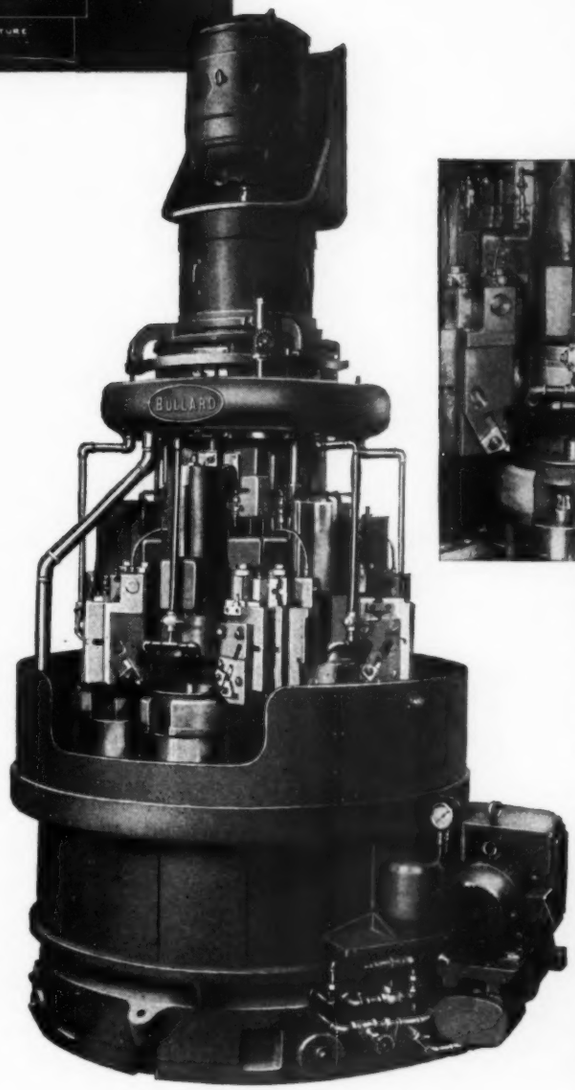
Bridgeport **THE BULLARD COMPANY** Connecticut

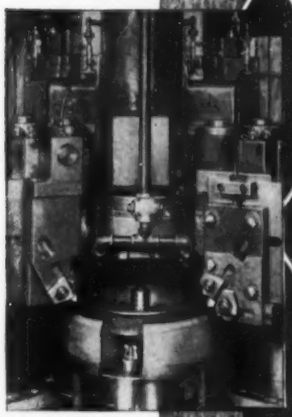
TURNING 1937 *into* PROFITS

Continuous Turning with the Contin-U-Matic Method—(different in principle from the Mult-Au-Matic)—provides 8 or 12 Spindles with each of the 8 or 12 stations rotating about a central column in fixed relation to its own spindle. Tooling is the same at all stations, and at the completion of the carrier cycle, each station produces finished work.









This continuous method of machining provides an extremely effective means of lowering manufacturing costs on large volume schedules.

Bullard Contin-U-Matics in every respect live up to rigid specifications for Accuracy, Long Useful life, Efficiency, Economy, and Profitable Investment when advantageously located in your production lines.

CONTIN-U-MATICS

Type	Size	Spindles
"D"	10"	6
"D"	14"	6
Hydraulic chucking on both sizes.		
2	10"	6
Power Operated Chucking.		
2	10"	12
Hydraulic Chucking.		

Bridgeport **THE BULLARD COMPANY** Connecticut

The New Industrial Dictionary
(Revised Edition)

If these and similar words are worrying you, perhaps our experience with other plants in applying the right meaning in the right place may be helpful to you.

ac'cu-ra-cy—Synonym for "customer demands." Can be secured by modern production machinery.

com'pe-ti'tion—The low-cost plant (there's one in every industry) which can undersell you.

in-fla'tion—Disease which destroys by bloating. Prophylactic: keep costs down by eliminating all possible waste.

mod'ern-ize—Act of replacing unprofitable with profitable equipment. Synonym: invest.

ob'so-lete—A machine which is unprofitable to operate today (measured by what modern machines can produce).

op'er-a'tor—Individual who creates profits or labor troubles, depending on attitude. To assure profits and Operator cooperation, supply modern equipment which makes job easier, and better earnings for himself and company more certain.

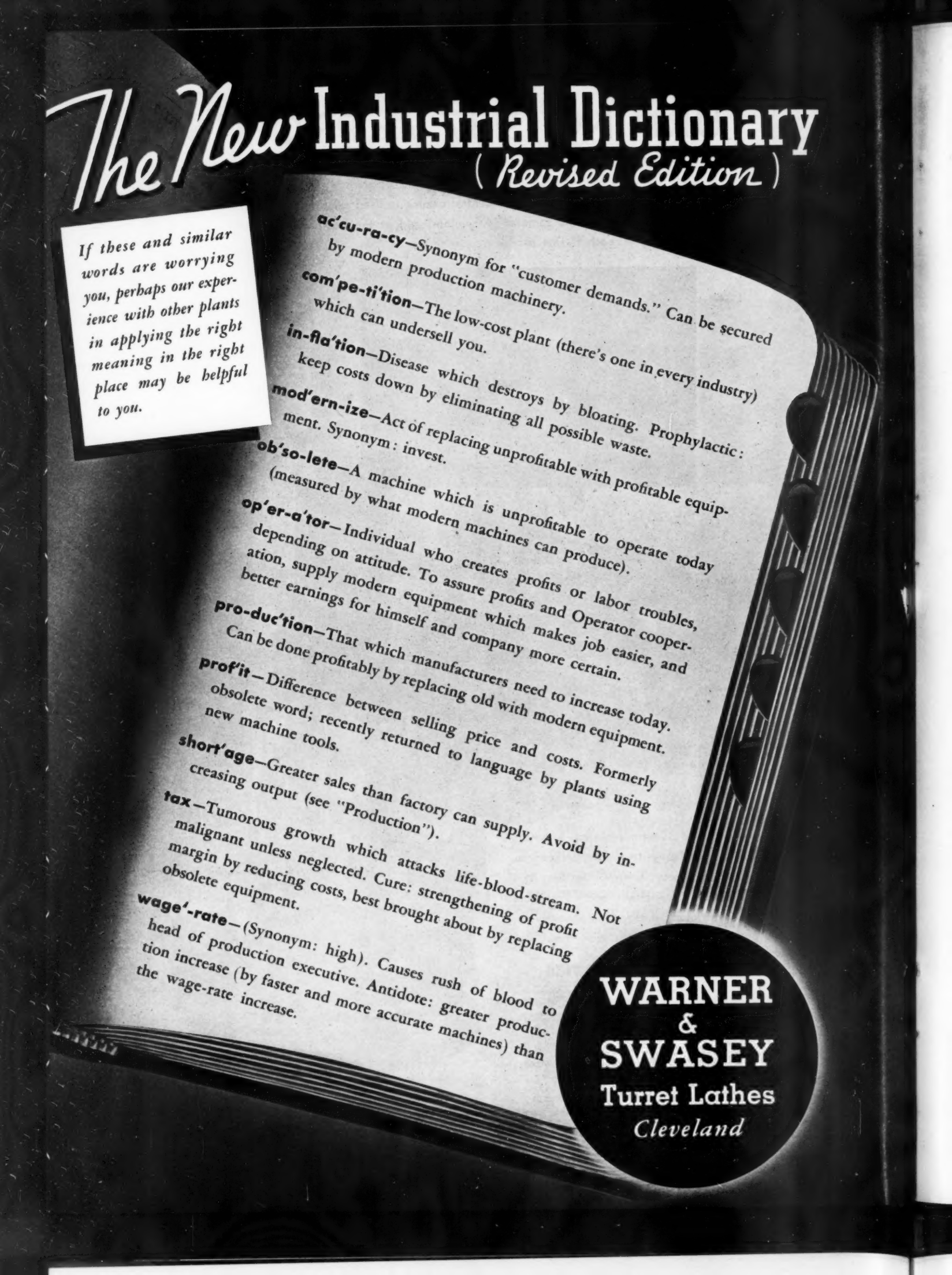
pro-duc'tion—That which manufacturers need to increase today. Can be done profitably by replacing old with modern equipment.

prof'it—Difference between selling price and costs. Formerly obsolete word; recently returned to language by plants using new machine tools.

short'age—Greater sales than factory can supply. Avoid by increasing output (see "Production").

tax—Tumorous growth which attacks life-blood-stream. Not malignant unless neglected. Cure: strengthening of profit margin by reducing costs, best brought about by replacing obsolete equipment.

wage'-rate—(Synonym: high). Causes rush of blood to head of production executive. Antidote: greater production increase (by faster and more accurate machines) than the wage-rate increase.



WARNER & SWASEY
Turret Lathes
Cleveland

Metal-Working Moves Ahead

IN DECEMBER the machine tool index went "through the roof." Averaging 136.3 for 1936 (as compared to 131.2 in 1928 and 155.8 in 1929) shipments in the closing month broke all precedent by hitting an all-time high of 257.7. The three months moving average, on which the National Machine Tool Builders' chart is based, moved up to 180.4, which curiously enough is almost identically the level shown in *American Machinist's* 1935 Inventory of Metal-Working Equipment as being necessary to restore the 1930 ratio of old to new equipment.

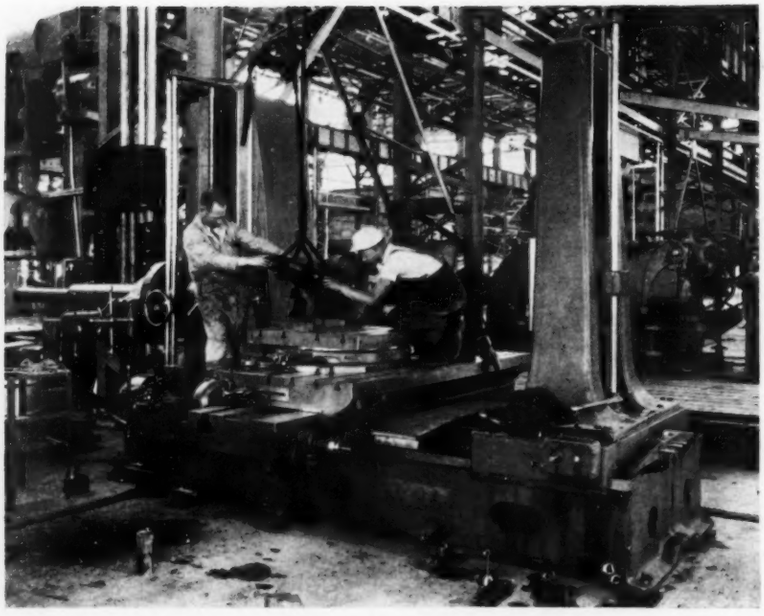
All of which indicates that industry is putting its house in order. In doing this it is profiting by the developments and improvements which equipment builders were courageous enough to carry on during the years when orders were scarce. Metal-working manufacturers today have little difficulty in finding equipment and materials that are distinctly better than those formerly available. Their only difficulty is in securing the deliveries they desire.

In this, our 24th Shop Equipment Review Number, we trace another year's progress in metal-working development. We do this by showing concisely, but in detail, 637 new items that were announced during 1936. Thus one listing forms a centralized abstract of the developments in machine tools, small tools, shop equipment, accessories, parts and materials that will serve as a guide to further plant modernization.

These items, prosaic in themselves, represent the dramatic triumph of cooperative effort, the work of head and hand of thousands of engineers and shop workers. These pages are pages in industrial history. They portray a great industry's contribution to a new and better way of living. We are proud to present them with the assurance that their reading will help speed the process of raising industrial efficiency to a new high level.

New Tools *for Old*

Last year's developments in shop equipment will improve this year's production in metal-working plants



***Machines Are Set Up*—Everywhere shops are installing equipment to make up for the deferred replacement of the depression years**

RECOVERY has not brought with it any slackening in development of metal-working and accessory equipment. During 1936 new designs were put on the market in as great volume as during the preceding year. The present review contains 637 items whereas that of a year ago had 640.

What is happening in machine tool design? The answer is simply that trends that became particularly strong after the development of tungsten carbide are still being pursued. Each succeeding year brings new evidence of the more thorough understanding and attainment of greater rigidity, power, metal-removing capacity, simplicity of control, reduction of idle times, and lessened fatigue for the operator.

Machinery builders are not working toward these ends by themselves. Whereas at one time practically all of the elements going into a machine were made in the builder's own shop, today this is far from being true. Specialized assistance is being obtained from the suppliers of parts, mechanisms and materials, and this cooperative pooling of knowledge by many minds is having and will continue to have a profound influence. It may be expected that inherently better machines will more rapidly make their appearance on the market for these reasons.

As a case in point, consider the rapid electrification of machine tools. It was only a short time ago that the prediction was made that electrified elements would gain in favor as the possibilities of electricity were better understood. Since that time the machine tool companies have hired electrical engineers to assist in design work. Then, too, the electrical manufacturing companies have come to realize the possibilities of this field and have assigned experts to the design of motors and control gear especially suited to machine tool needs. These combined efforts are changing the appearance of shop equipment.

Of course, the rapid electrification of machine tools does not mean that hydraulic feeds and clamping and the use of air equipment has gone into a decline. Quite the contrary. These are undergoing great technical improvement and are finding new applications constantly.

Anti-friction bearings, alloy steels in gears and shafts, alloy irons for castings, built-in lubrication, V-belt drives, and other similar items highly stressed in specifications, have now become commonplace. From year to year certain lines of machinery undergo more development than others and to keep abreast of what has been done a quick survey of the review pages that follow is in order.

Boring Machines

Miscellaneous castings can be readily bored, drilled and face-milled on the single horizontal boring machine under review. This machine is a small 3-in. spindle model with an elevated stationary table and a traversing column. Two combination drilling and jig boring machines are of somewhat similar pattern. In the first, measuring rods are used to position the table to 0.0001 in., and in the second an option is available concerning accuracy of table movements. For

work where tolerances of 0.001 in. are permissible, reliance is placed on large dials on the table leadscrews, but where measurements of 0.0001 in. are required, precision leadscrews and end-measuring rods are substituted.

Precision boring machines include a vertical model for bores of 2 to 9 in. in diameter. A finish suitable for subsequent honing with a 500-grit stone is claimed. As a further adaptation of the horizontal precision boring machine, the unit shown has three heads mounted 90 deg. apart. These heads function under automatic electric control to finish holes on three faces of a part simultaneously.

Broaching machines, both internal and surface, are undergoing rapid development and show greater adaptability to line production. Some of these machines are of huge size, particularly those installed in the automotive plants for spline broaching of gears and for surface broaching on cylinder blocks. Adequate support of the tools and hydraulically actuated rams are universal features.

The spline broaching machine for gears is 16 ft. high and is powered with motors totaling 60 hp., developing a 60-ton pressure on the ram. Another development is the internal broaching of a rough cored hole, without the broach following the out-of-line condition of the hole. Two cutting strokes are made, the work indexing 30 deg. before the second stroke begins.

Numerous surfacing operations on cylinder blocks are now being done by the broaching method. Lock seats on crankshaft-bearing caps are surface broached on one machine arranged with a hydraulically elevated table. Another firm supplied two machines, one unit for surfacing the bottom and the other for operations on the top of either six- or eight-cylinder blocks.

Buffing, Polishing and Cleaning Equipment

To save the expense of buffing a formed part, sheet stock can be buffed before forming operations on a machine that has a revolving drum below the buffing wheel. Sheets are laid on the drum which carries them under the wheel for cutting down, buffing or satin finishing operations. In contrast, a machine for buffing work after it is formed or drawn, is made with fourteen adjustable, independently driven wheelheads. These are tilted to assure proper buffing and polishing action at all points on the contour of the work.

Degreasing machines, particularly the solvent type, were developed in small and large sizes during the year. The small model shown is for manual dipping of the work, but the larger installations are conveyorized and designed for production in the order of 6,500 small parts per hour. Another parts washing machine is intended to be used in connection with automatic grinders or similar machines, but of course need not be operated directly in the line of production it desires.

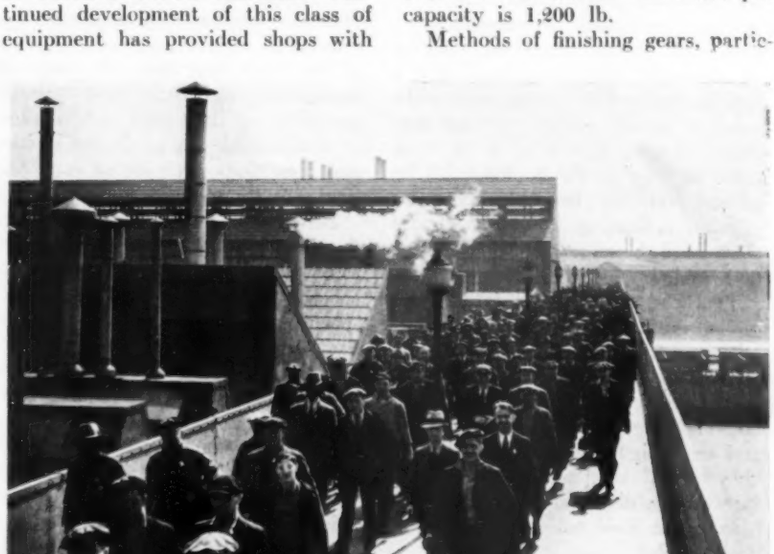
Bar stock, tubing, structural shapes, and even sheets are now being cut off in increasing quantities by means of abrasive cut-off machines. Continued development of this class of equipment has provided shops with machines that will produce pieces with parallel faces or with a minimum amount of material to be removed by grinding or other means. Some models are intended for quick chopping action, others for work held in vises and in some cases advanced under automatic feed. The majority have coolant systems.

Metal-cutting bandsaws for die and tool work captured attention at the Machine Tool Show in 1935, and since then the builders of these machines have broadened their lines and made many improvements. One of the new models is a bench type, capable of cutting and filing work up to 6 in. thick, while the throat depth is 12 in. Besides this small model, machines of extended throat depth are offered, in fact up to 25 in. Saw brazers and other attachments are built right into the machine and a grinder is often supplied to finish the joint to the proper thickness. Power work feeds enable precision sawing to be done; inside and outside circle cutting attachments save time.

Die casting of brass is a comparatively new art, but two new makes of machines for the purpose are reviewed. Both types are fully hydraulic in operation and in some cases the pressures range up to 50,000 lb. per sq.in. There is shown the largest zinc die casting machine ever built. Effective capacity of the gooseneck is 25 lb. of metal and the metal pot capacity is 1,200 lb.

Methods of finishing gears, particularly those for automotive uses, still occupy a major share of the design efforts of builders of gear-cutting machinery. One finishing machine operates on a principle that differs in several respects from the well-known gear shaper method. The tool is of the "enveloping" type, and has a combined cutting and burnishing action. A true gear shaper uses a cutter with gaps in the teeth so that gears can be unloaded and loaded without stopping the machine. Roughing and finishing are done by the separate sets of cutter teeth.

Marked progress has been made in recent years toward better ground finishes. Highly reflective surfaces are demanded on such items as rolls for steel mills and other mill ma-



***Men Are at Work*—Crowds of shop workers reflect industry's increasing tempo with its mounting payrolls and increased employee purchasing power**

chinery, and also in aircraft cylinders. Additional improvements have been made during 1935 on equipment to produce both classes of work. In a cylindrical grinder for work of medium size, the improvements include load-compensating bearings that allow light or heavy cuts, pressure lubrication of these bearings, and a smooth running drive to the wheel spindle secured by a combined V-belt and silent chain drive.

An internal grinder for airplane cylinders is built with the object of producing an exceptional finish under commercial conditions. The cylinders, moreover, are held exactly as they will be when finally assembled, eliminating cramping or misalignment with the piston. Another machine of somewhat similar pattern has a gap in the bed to swing parts awkward to handle on the average machine. Entire sleeves of 4 to 8 in. O.D. and up to 16 in. long can be ground on an internal centerless grinder, indicating the great strides that have been made in this class of machine.

Tool and cutter grinders are simplified, more easily set up for various jobs, and the controls are made more convenient for the operator. Carbide-tool grinders have heavy spindles and large bearings to eliminate vibration and are designed for the interchangeable use of silicon-carbide cup and face wheels, diamond wheels and lapping disks. Tool tables are substantially made.

Three automatic universal thread grinders indicate greater interest in precision ground bolts, taps, gages and other threaded work. In one model a self-truing, self-sizing mechanism keeps the wheel sharp without disturbing the size adjustment and without attention from the operator.

Heat-Treatment

It is now well recognized that proper selection of the heat-treatment and control of the conditions pertaining thereto will produce a more satisfactory product and effect definite economies in the machining and finishing operations. These considerations have produced considerable activity in development of furnaces and control equipment. Visitors at the 1936 Metal Show in Cleveland were impressed by the many trends in evidence. Improved firing of gas and oil furnaces effects definite heat economies, maintains greater uniformity of product and allows the work to be produced clean and bright or scaled to suit requirements. Products of combustion can be regulated at the atmospheric burners to give controlled atmospheres or special gases are generated outside of the furnace and fed into a closed muffle in which the work is placed. Recirculating systems for heated air are used with certain types of furnaces. In one toolroom furnace, blowers force air through electric heaters and thence through the charge, finally returning to the fan and being recirculated.

Tocco Process

The newest development in hardening is the Tocco process which depends upon heating the work by electrical induction. Only the surface that is to be hard is affected. For example, the bearing surfaces on a crankshaft are hardened but the cores of the pins and the webs are left untouched. Thus, the most desirable properties of the steel are retained or obtained for the particular stresses and conditions applying at each particular portion of the shaft.

Bench and engine lathes offered during 1936 are intended for toolroom work. One of the bench lathes has a Transitorque drive to give any spindle speed between 200 and 2,000 r.p.m. Turret lathes have been improved to afford lessened physical effort with greater output, greater capacity to absorb strains from overhanging tools and improved spindle drives. Instead of using a gear train, one turret lathe has a V-belt drive from a d.c. motor direct to the spindle. When another speed is required, the sheave on the spindle is quickly replaced.

Rising production of diesel engines has made a field for large heavy-duty crankshaft lathes. One of the machines offered for these heavy cranks is entirely automatic in operation. For the usual automotive crank there is a four-station automatic machine which removes a relatively small amount of stock at each operation, thus eliminating strains. In consequence, a straightening operation is eliminated and rough grinding can be dispensed with.

Larger work capacity, greater accessibility to the tooling, and reduced set-up time are features of the 1936 chucking machines. Screw machines are more productive, and correct surface speeds for any material are readily obtained. Speeds up to 6,000 r.p.m. are available in one model of $\frac{3}{8}$ in. capacity. Moreover, full advantage of the free-cutting properties of aluminum and other non-ferrous metals can be taken.

Plain milling machines tend toward a design that lends itself to either job-lot or production quantities. Full electrical control of all table and spindle movements by direct-connected motors to each element is featured in one machine. There is a virtual elimination of the usual handwheels, push-buttons causing the various machine motions to respond. Naturally a much cleaner-looking design results.

A vertical bench miller has a ball-bearing spindle that operates at speeds up to 5,000 r.p.m. for intricate milling operations on small parts. Die- and mold-duplicating machines operate on the pantograph principle, work in three dimensions, and always have the cutter spindle vertical even in deep molds.

Presses

Large formed and drawn parts such as automobile body sections and bathtubs have caused press builders to consider four-point suspension of the slide in order to maintain alignment between this vital part and the bed. The press shown has a double-roll feed and an automatic uncoiler for wide strip stock.

Hydraulic presses are intended for such diverse operations as assembly, clamping, riveting, cupping and drawing, die spotting, molding, straightening, and upsetting. Deep-drawing presses are fitted with pumps and hydraulic circuits to give fast travel of the punch to the blank, automatic slow-down to the proper drawing speed, and fast reverse. Presses four stories in height and of 1,300 tons capacity indicate a growing demand for large equipment in aluminum and automotive fields.

Portable arc welders now have close control of heat for better penetration, and models have been introduced to enable thin sheets to be welded economically. Shape-cutting machines have greater range of plate size and work automatically or under hand control. Development of electrodes has resulted in types for stainless steel, for thin-gage sheets, for low-chromium steels, and for phosphor bronze. These will allow greater use of the welding art in numerous fields.

Among processes, there is one for getting a combined carburized and nitrided surface on steel. Distortion is reduced and the treated surface is highly resistant to corrosion. It will take a polish. Bright zinc plating may now be done with heavy deposits and in any type of equipment. A white alloy plating process gives a mirror finish and is said to require no after buffing. These are only a few of the developments described.

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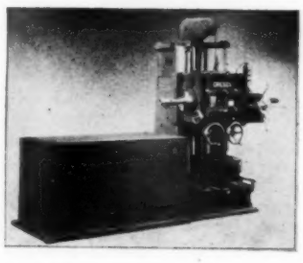
Boring Machines

Boring, Drilling and Milling Machine, Horizontal

Bryant Machinery & Engineering Co., 400 West Madison St., Chicago, Ill. (Vol.80,p. 388.)

This Dreses stationary table-type horizontal boring, drilling and milling machine is distributed by the above concern. It can be furnished in various table sizes, combined with various vertical travels of the spindle head and various travels of the column on the runway. Vernier scales reading to 0.001 in. are furnished, but a precision dial and rod measuring device can be furnished for the head and the column.



The head contains all the driving mechanism for the spindle, the feed change unit for the drilling and boring feeds to the spindle, and milling feeds to the head and column. Eight feeds can be applied to every spindle speed. A feed reverse is furnished. The entire control of the machine is located on the head.

Boring Machine, Jig

Marburg Bros., Inc., 90 West St., New York, N. Y. (Vol.80, p. 837.)

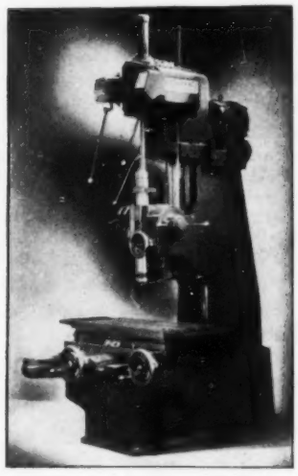
The Moore jig borer has been improved in design. Hardened, ground and lapped leadscrews are now corrected to such an extent that the accuracy of the entire length of the longitudinal screw is within 0.0002 in. and that of the cross screw within

0.0001 in. from any one position to another over their full length. Accuracy from any one inch to another is guaranteed to be within 0.00005 in. A graduated dial is furnished for indicating accurate quill position. The micrometer stop on the column gives an independent and accurate stop for the down movement of the quill head.

Boring Machine, Jig

Fosdick Machine Tool Co., Cincinnati, Ohio. (Vol.80,p. 970.)

This combination drill and jig borer can be used as an efficient drill press and features the accuracy required on a jig borer. Both the slide and the table can be locked solidly together by means of



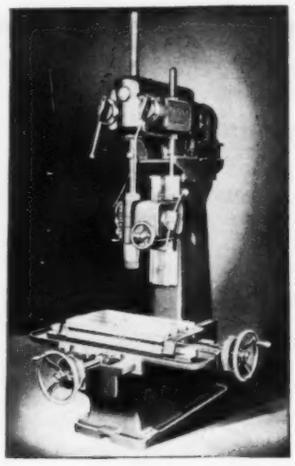
clamps placed directly in front of the operator. To position the table accurately a 0.0001-in. indicator is used in combination with measuring rods and a 0.0001-in. micrometer.

A gearbox provides twelve spindle speeds with a range of 60 to 1,500 r.p.m., and nine feeds with a range of 0.0025 to 0.020 in. A direct-reading depth gage is provided for drilling, and a measuring device is furnished for accurate spot-facing or counterboring. The machine has a capacity of 15 in. from spindle to face of the column and the table has a movement of 15x30 in. Distance from the spindle to the top of the table is 24 in.

Boring Machine, Jig Cleereman

Bryant Machinery & Engineering Co., 400 W. Madison Street., Chicago, Ill. (Vol.80, p.972.)

This Cleereman toolroom layout machine for drilling and jig boring operations will handle all tool, die, jig and fixture layout work where a tolerance of 0.001 in. in either direction is permissible. Eight-



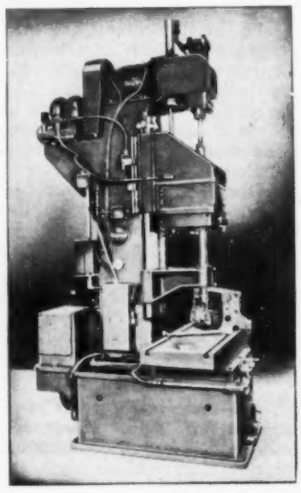
inch diameter reading dials on the table leadscrews facilitate accurate readings. Scales, graduated in sixteenths, are mounted on the ways for a quick check on table movements in both directions.

Precision leadscrews can be substituted for the cut lead screws regularly furnished. These lead screws are guaranteed accurate within a tolerance of 0.001 in. in 2 ft. of length. Built-in dial indicators graduated to 0.0001 in., 1-in. inside micrometers reading to 0.0001 in. and precision end-measuring rods in 1, 2, 3, 6 and 12 in. lengths can be provided for each direction of table travel.

Boring Machine, Cylinder

Baush Machine Tool Co., Springfield, Mass. (Vol.80,p. 1018.)

This precision deep-hole cylinder boring machine is designed for boring cylinders with close tolerances for straightness, alignment and true roundness. The machine consists of a heavy steel base and a rigid cast-iron column, on which is mounted the boring head and the hydraulic "Centerfeed" cylinder. A high

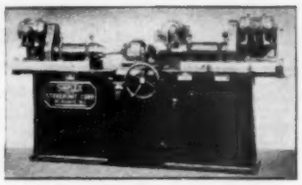


degree of accuracy of the boring operation is attained with four special "Catspaws," in the boring bar tube, which support the bar directly behind the revolving single-point tool during the entire down feed stroke. Holes 2 to 9 in. diameter can be bored to any reasonable depth.

Boring Machine, Precision

Stokerunit Corp., 5325 W. Rogers St., Milwaukee, Wis. (Vol.80,p.31.)

Three spindle platens are shown on the "Simplex" precision boring machine illustrated. One or more spindles



can be mounted on each platen. Thus, the machine provides for precision boring of several holes simultaneously on different faces of a part. An individual motor drives the feed through pick-off gears. Either manual or automatic cycle can be had. Maximum feed length, 12-in; diameter holes, $\frac{3}{8}$ to 8-in.; space for fixture, 16 in. sq.; weight of machine, 4,800 lb.

Broaching Machines

Broaching Machines, Internal

Colonial Broach Co., Detroit, Michigan. (Vol.80,p.596.)

Designated as universal pull types, the horizontal internal and surface broach (HA-1) series comprises six models. They are available in from 6- to 20-ton capacities and in 48- and 60-in. strokes. This group is particularly adapted to the broaching of keyways and round and splined holes. Faceplate capacity is such that the machine can accommodate a wide range of surface broaching fixtures with tools up to 10 in. in over-all width. Standard cutting speed is 30 ft. per min. with variable-speed control incorporated in the design. Return stroke is at rate of 60 ft. per min. Coolant supply starts and stops with the machine.

Similar in many points, the high speed "Pusher" (HB-1) horizontal surface push-type broaching machine is suited for continuous production of small parts, such as are used in washing machines.

Broaching Machines, Internal

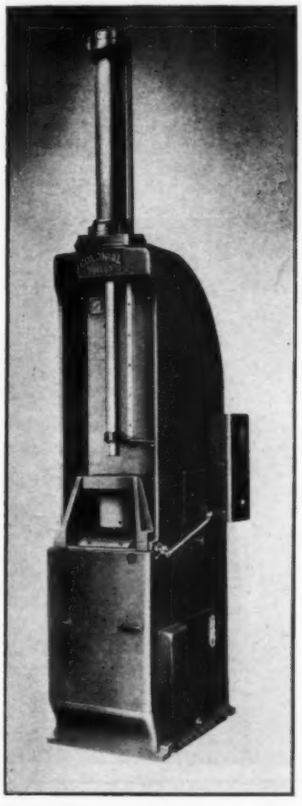
Colonial Broach Co., Detroit, Michigan. (Vol.80,p.596.)

Available in from 6 to 15-tons ram capacity and in strokes of 24 and 36 in., the "Utility" line of hydraulic broaching machines is adaptable to a wide range of internal broaching operations. It is possible to mount several single-ram units on a single base with continuous feed fixtures. Each unit is easily changed over from one size to another to satisfy production requirements. Of welded-steel and cast-iron construction, each unit is self-contained. Extra large coolant tanks and pumps are provided. Chips drop into large, easily cleaned containers.

Broaching Machines, Internal, Pullup

Colonial Broach Co., Detroit, Michigan. (Vol.80,p.596.)

Designed for high-speed internal broaching, the vertical "Pullup" (VC-1) series is available in three models. Capacities range from 6 to 15 tons with a standard 36 in. stroke. These units are especially adapted for broaching such parts as bushings and finishing interal gears, where fairly light cuts are to be taken and a high production rate is demanded. They are



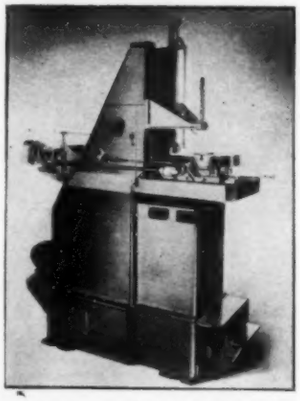
suitable for short-run operations where ability for rapid change-over is essential. Cutting speed is 30 ft. per min. with a 60 ft. per min. return.

The heavy-duty vertical "Pullup" (VG-1) series is complementary to the VC models. Its application comes in such fields as broaching large gears, long holes, spiral gears and roughing large holes. This type is available in capacities from 10 to 20 tons and 48 and 60 in. strokes.

Broaching Machine, Internal, Automatic

LaPointe Machine Tool Co., Hudson, Mass. (Vol.80,p.744.)

Eighty involute splines are broached in the 6-in. thick hub of a cast-steel tractor drive gear by this automatic machine in 16 min. The machine is equipped with an automatic indexing mechanism consisting

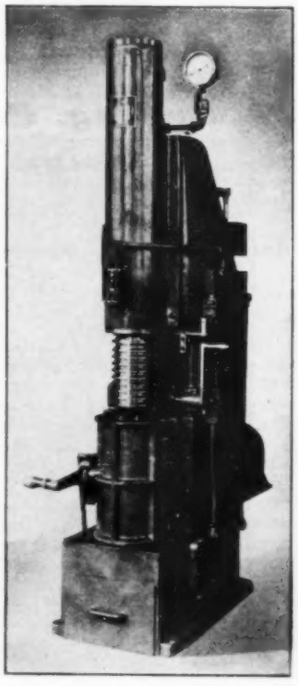


of rotary work table and slide, and an indexing change gear box driven by an electric motor. The 30-in. diameter table is arranged for tipping to any desired angle and has two slots for clamping the work.

Broaching Machine, Internal

American Broach & Machine Co., Ann Arbor, Mich. (Vol.80,p.816.)

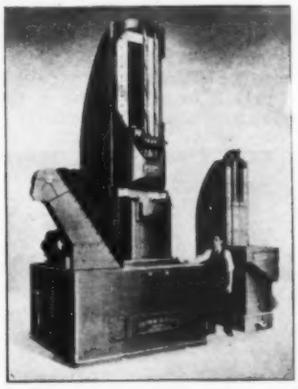
This 15-ton vertical, hydraulic, broaching machine finishes the bore in 6-in. diameter type-metal printing cylinders or mats. The ram has a slide-way which causes the broach to travel down accurately in reference to a clearance groove in the work piece. The last section of the broach has a slight burnishing action so that the cutting teeth do not drag over the finished surfaces on the return stroke. The front of the fixture is hinged on one side, while the other side has a quick-acting cam lock. At the top of the front half of the fixture is an adjustable block for retaining mats of different lengths during the broaching operation.



Broaching Machine, Internal, Spiral-Spline

Colonial Broach Co., Detroit, Mich. (Vol.80,p.780.)

This large, hydraulic, vertical broaching machine has been installed in an automobile plant for broaching spiral splines in gears. The machine is 16 ft. high and was installed in a 4 ft. deep pit to give



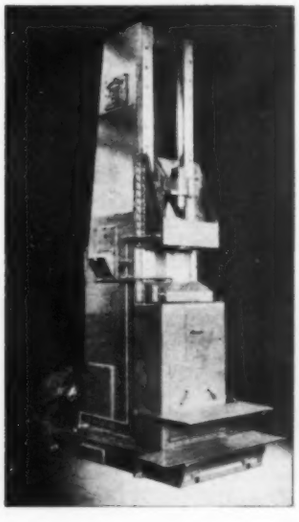
necessary ceiling clearance. A 40-hp. and a 20-hp. motor are coupled directly to a combination of hydraulic pumps to produce 30-ton pressure on the ram. Cutting speed is 30 ft. per min. at this pressure. Ram stroke is 60 in. and two gears are broached per cycle.

Broaches are handled by hydraulic cylinders and the spiral feed is produced by spiral driving bars connected through a gearbox to the broach pulleys. The machine can be changed so as to be used for straight broaching.

Broaching Machine, Internal

American Broach & Machine Co., Ann Arbor, Mich. (Vol.80,p.816.)

The model V-58 semi-automatic hydraulic broaching machine has a normal working capacity of 50 tons and a



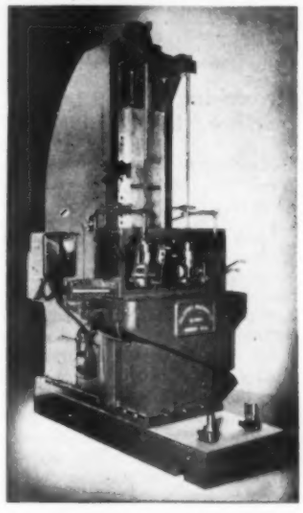
maximum capacity of 56 tons. This unit, as illustrated, is designed for pulling the broaches upward. If conditions necessitate, it can be arranged for pulling the broaches downward. The one-piece column has adjustable, hardened and ground, wear-plates and gibs.

This machine is 14½ ft. high and requires 4½ x 8 ft. of floor space. Maximum cutting speed is 18 ft. per min. and return speed is 24 ft. per min. The machine will take work having a maximum diameter of 13 in. and the longest broach it will pull is 68 in.

Broaching Machine, Internal, Cored-Hole

Colonial Broach Co., Detroit, Mich. (Vol.80,p.935.)

A single ram, 15-ton machine is fitted for using splined broaches and taking two cuting strokes through the same round cored hole. Thus round holes

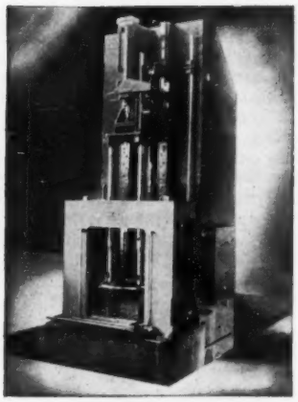


can be finish-broached accurately in a rough casting without the broach following an out-of-line condition in the cored hole. Bushings are provided above and below the work pieces to prevent broach deflection. Holes are broached to a tolerance as to size and straightness of within 0.002 in.

Broaching Machine, Internal

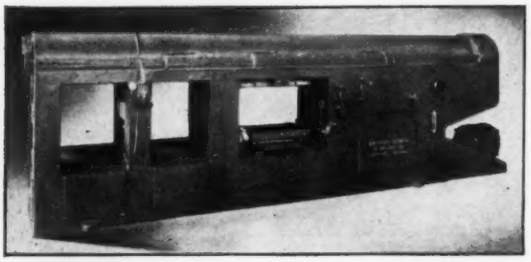
Oilgear Co., 1403 West Bruce St., Milwaukee, Wis. (Vol.80, p.1057.)

This Type "XM-80" Cyclematic broaching machine has been set up for finish-broaching 3⅛-in. diameter by 7 1/16-in. long dynamo yokes. Two of these hot-rolled steel yokes are finish broached per machine cycle and the hourly production is 300 yokes. Broaches used are 58 in. long and the 52 teeth remove approximately 0.035 in. stock from each yoke. The machine has a peak broaching capacity of 120,000 lb., and a maximum stroke of 54 in.



of these machines broaches the pan-rail or bottom-face and the bearing cap seats on both 6- and 8-cylinder blocks. The second machine broaches the top or cylinder-head surface on the same two blocks. Work-holding fixtures on both machines are so designed that no change-over is necessary to accommodate either block. Production per machine is between 50 and 55 cylinder blocks per hour and one workman can easily operate the two equipments.

The inserted-blade broaching tools have been designed to permit the removal of approximately 3/16 in. of metal in the minimum amount of time.



Broaching Machines, Surface, Horizontal

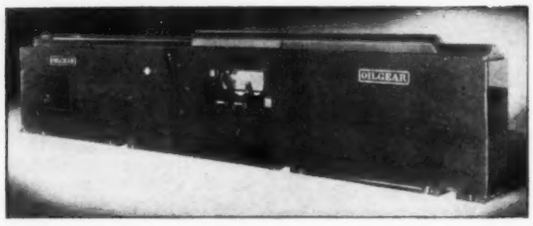
American Broach & Machine Co., Ann Arbor, Mich. (Vol.80,p.816.)

Lock seats for crankshaft bearing caps are surface broached in cylinder blocks with this horizontal machine. The hydraulic cylinder is integral with the sliding member to provide support for the broach. This construction permits placing the slides above the cut where they are free from dust and chips and results in accurate alignment. The fixture is carried on a table which is actuated hydraulically. In its lower position the fixture is at a height suitable to receive the cylinder blocks from the shop conveyor. When loaded the block is raised and clamped against hardened rest plates and dowel pins. The cutting cycle is automatic.

Broaching Machine, Surface, Horizontal

Cincinnati Milling Machine & Cincinnati Grinders Inc., Cincinnati, Ohio. (Vol.80,p. 814.)

Two large hydraulic surface broaching machines with horizontal stroke were built for an automobile manufacturer. One

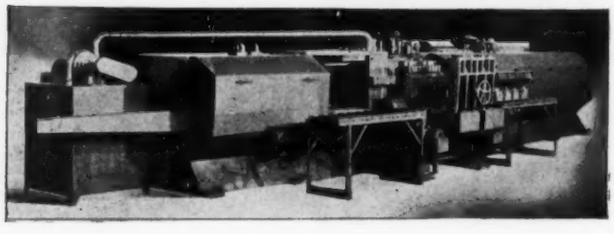


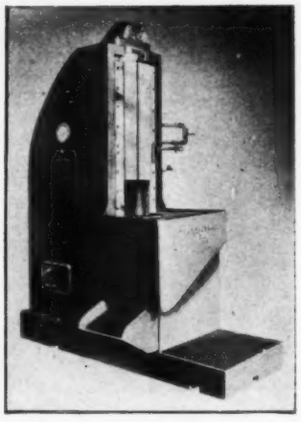
Broaching Machine, Surface, Horizontal

Oilgear Co., 1319 W. Bruce St., Milwaukee, Wis. (Vol.80, p.1024.)

This hydraulic surface broaching machine is used for rough and finish broaching the sides and bottom of the main-bearing cap surfaces that meet with the web of the crankcase of an 8-cylinder motor. A similar machine broaches the main-lock seat and rough crank bore in 6- and 8-cylinder blocks.

The machine illustrated has a normal broaching speed of 24 ft. per min. and a return speed of 60 ft. per min. The generative-type tools are mounted in an inverted, heavy toolslide above the work. Production capacity is 60 blocks per hour. Positive interlocks are provided for each step in the operating cycle. The machine is 28 in. wide, 67 in. high and 26 ft. long. Weight is 32,000 lb.





Broaching Machines, Surface, Vertical

Colonial Broach Co., Detroit, Michigan. (Vol.80,p.596.)

Part of a complete line, these vertical surface broaching machines are available in single- and dual-ram types. They are adaptable to line production operations, have receding tables for work clearance during the return stroke and while loading, and are easily changed from one size to another in the event of production changes. These models are available in tonnages from 6 to 25 tons and in strokes from 36 to 60 in. They will handle surface broaches having a maximum width of 13½ in.

Broaching Machine, Surface, Vertical

Colonial Broach Co., Detroit, Michigan. (Vol.80,p.956.)

The VF-1 series is designed for light shaving with surface type broaches, broaching small keyways, pressing in bushings and other assembly work. Three light-duty presses are available in this series, ranging from 1 to 4 tons capacity. All three models have an 18-in. stroke and are hydraulically operated.

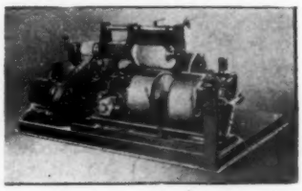
At the other end of the range, for broaching large spiral and straight gears and ring gears, and for large surface broaching up to 2 ft. in width, there is a line of "Power Presses" of the double-column type (VK-1). These are available in any capacity and virtually any length of stroke. Operation of the rams is hydraulic, as in all other Colonial types, with an operating pressure of 1,000 lbs.

Buffing, Polishing and Cleaning Equipment

Buffing Machine, Sheet

Divine Bros. Co., Utica, N. Y. (Vol.80,p.672.)

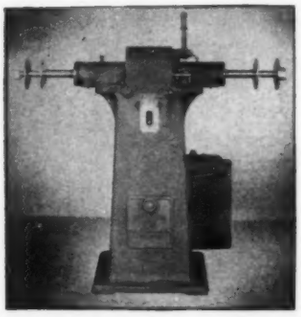
Both tubular and sheet stock can be buffed before forming and then touched up after forming on this machine. Ferrous and non-ferrous sheets are cut down color buffed or satin finished. Sheets in any size ranging up to 16 in. wide by 7 ft. long by 0.020 in. thick can be taken. Sheets are held on a revolving drum by vacuum or magnetic chucks. The wheel spindle is provided with a mechanism to oscillate the buff, thereby eliminating streaks in the work. Drive is by a 20-hp. motor.



Buffer and Polisher, Selective-Speed

Standard Electrical Tool Co., 1940 W. 8th St., Cincinnati, Ohio. (Vol.80,p.391.)

With the selective-speed buffing and polishing machines of 3, 5, 7½, 10, 15 and 20 hp., it is possible to obtain any spindle



speed required. When they are equipped with a patented adjustable speed sheave, a spindle speed increase of 50 per cent may obtained with an infinite number of steps. Power is transmitted to the buffing spindle by four V-cog belts. An elevating screw permits raising and lowering the 1,800 r.p.m. ball-bearing motor to put the required amount of tension on the belts. The entire spindle may be removed intact for renewing belts without disturbing the ball bearings.

Polishing and Buffing Machine, Fourteen-head

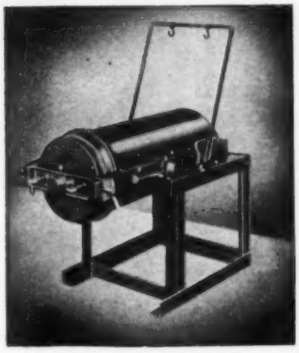
Packer Machine Co., Meriden, Conn. (Vol.80,p.30.)

Thirty-eight work-holding fixtures are mounted on a conveyor chain moving between fourteen polishing and buffing wheel heads. Each wheel head is adaptable to any type of polishing or buffing, and an automatic applicator at each will apply polish compound to the wheel. The axis of the polishing wheel shaft on any head can be tilted to place the polishing wheel against any side or surface of the rotating work. One variable-speed drive advances the work through the machine and other variable-speed drives rotate the work while it is being polished. The machine is 7 ft. wide and 42 ft. long.

Burnishing Barrel, Mercil

Hanson-Van Winkle-Munning Co., Matawan, N. J. (Vol. 80,p.177.)

Barrel, gearing and motor of this Mercil barrel are combined in one unit. Operation at any angle is quiet and efficient, and the angle may be changed while

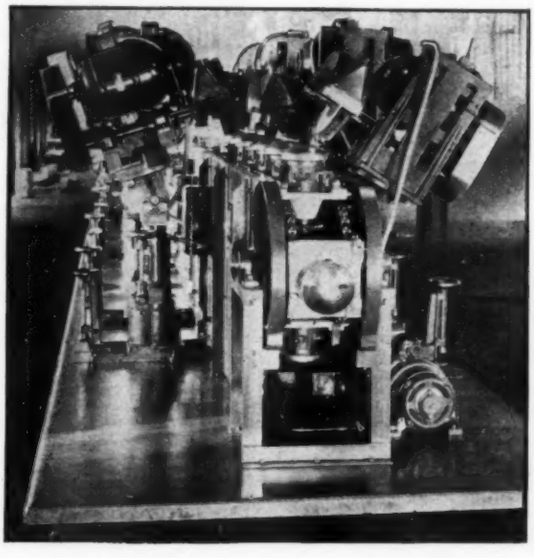


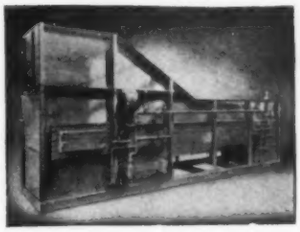
the machine is running. Notched plates on the right-hand trunnion bearing lock the barrel at the desired angle. A cover-lifting device and support facilitate handling the machine and the work.

Degreasing Machine, Small Parts

Detroit-Rex Products Co., 13005 Hillview Ave., Detroit, Mich. (Vol.80,p.897.)

This vapor-spray-vapor Detrex degreaser handles small racked parts such as poppet valves and flat sheets. It will clean approximately 6,500 small parts per hour. Work is carried by the conveyor through solvent vapors, then through pressure sprays of hot, clean solvent and then back through the vapors to leave the machine at the entering end. Over-all dimensions: 20 ft. long, 5 ft. wide and 9 ft. high.

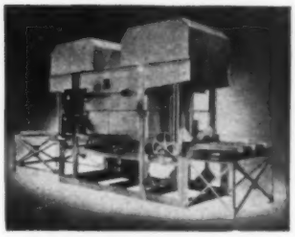




Degreasing Machine, Vapor-Type

Detroit-Rex Products Co., 13005 Hillview Ave., Detroit, Mich. (Vol.80,p.1019.)

This an automatic, conveyorized, vapor-type "Detrex" degreaser for cleaning heavy-gage metal parts. Electric immersion heaters, with thermostatically controlled relays and line

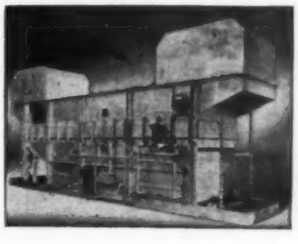


switch, are employed. The conveyor is of the two-strand, cross-rod type and is equipped with a variable-speed drive. Automatic loading and unloading is effected by roller-type gravity conveyors at each end of the machine. This machine will clean over 6,000 lb. of heavy-gage metal parts per hour at a conveyor speed of 1 ft. per min. The complete cleaning cycle requires about 4½ min. and parts are delivered clean and free from oil. Seventeen special fixtures handle the work baskets.

Degreasing Machine, Model 3 DC-650

Detroit-Rex Products Co., 13005 Hillview Ave., Detroit, Mich. (Vol.80,p.897.)

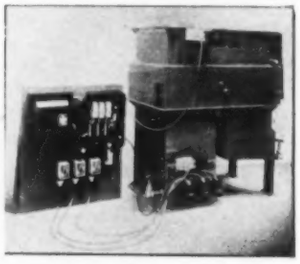
Production cleaning of large stampings and deep-drawn parts is done on this large three-dip degreaser, consisting of three chambers separated by two wide overflow dams. It is equipped with a two-strand, cross-rod type conveyor and a variable-speed drive. The work is placed in baskets which are hung from the conveyor cross rods.



Degreasing Machine, Solvent-Type

Detroit-Rex Products Co., 13005 Hillview Ave., Detroit, Mich. (Vol.80,p.783.)

In the Size 624 two-dip solvent degreaser, the work is usually handled manually in baskets or on racks. Both immersion and vapor cleaning are performed. The usual sequence of

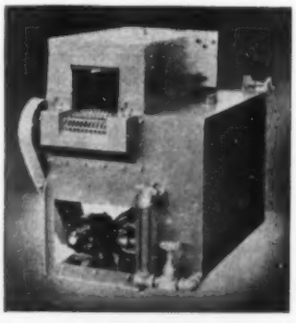


operation is to immerse the work in the boiling chamber, cool it in a clean solvent rinse, and finally suspend it for a few seconds in the pure solvent vapors over the boiling chamber. The cycle of cleaning operations is accomplished in less than a minute and every trace of oil and grease is removed. Work is delivered clean and dry. Solvent is condensed and re-used, very little make-up is needed.

Washing Machine, Midget

Metalwash Machinery Co., 27 Haynes Ave., Newark, N. J. (Vol.80,p.599.)

This midget washing machine will clean parts as fast as they come from automatic grinders or similar machines, and will then automatically discharge them to tote boxes or conveyors. The chain-belt conveyor is 9 in. wide and has a 6 in. clearance. Conveyor speed can be from 3 to 10 ft. per min. For smaller work, a rotary drum with spiral screw is used instead of the chain belt. Floor space, 3 ft. 10 in. x 3 ft. 9 in. Alkali compound for cleaning or oil slush for rust proofing can be used.



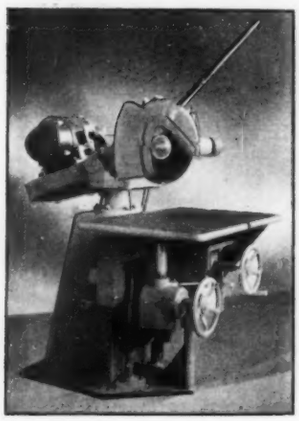
Solutions can be heated by steam, gas or electricity. The solution pump and the conveyor driving mechanisms require approx. 1 1/6 hp.

Cut-Off Machines

Abrasive Cut-Off Machine

Tabor Mfg. Co., 6225 Tacony St., Philadelphia, Pa. (Vol.80, p.255.)

The "Tabor-Brasive" cut-off machine comes in four types. It can be used with stationary head; with combination stationary and chopping head; with traversing

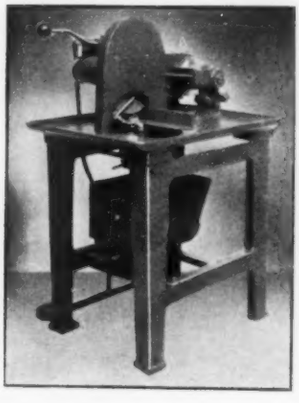


head; and with traveling table. The machine is suitable for cutting castings, bar stock, strip steel, tubing, structural shapes, tile, brick, refractories and similar materials. The table is adjustable for height.

Abrasive Cut-Off Machine

White Engineering Laboratories, Inc., R.F.D. 1, Paterson, N. J. (Vol.80,p.316.)

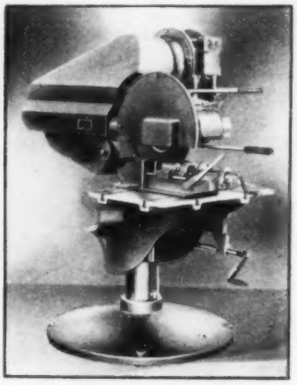
This is an abrasive cut-off machine for plastic rods and bars, which may be operated either by hand or foot. It is designed for cutting softer materials up to 2½ in., but may be used for cutting small sizes of steel, either dry or under the flow of water. The coolant is automatically shut off by raising the wheel arm.



Abrasive Cut-Off Machine, Universal

Bethlehem Foundry & Machine Co., Bethlehem, Pa. (Vol. 80,p.388.)

This machine can be used with either chop-cut or draw-cut stroke. Thus, structural angles or channels may be cut with one set-up in the vise, and small work, such as bars, strip,

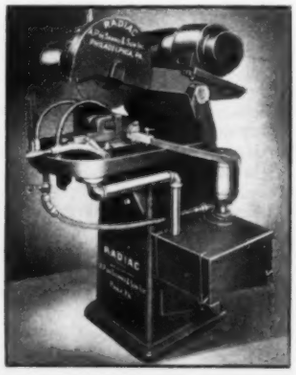


tube, pipe and cable, may be chopped off. This machine will cut at any angle by swinging the head to position indicated by a graduated scale.

Abrasive Cut-Off Machine, "Radiac," Type J

A. P. de Sanno & Son, 1615 McKean St., Philadelphia, Pa. (Vol.80,p.837.)

The Type J Radiac cuts solid material up to 2 in. diameter and tubing up to 3½ in. diameter. A large volume of cool-



ant is directed on both the work and the cutting disk. Height, 65 in.; floor-space, 61x38 in. A quick-acting clamp holds the work. The head which supports the motor and contains the wheel-spindle is of heavy construction and is well-balanced.

Abrasive Cut-Off Machine, Universal, No. 37

Whitney Metal Tool Co., 105 Mill St., Rockford, Ill. (Vol. 80,p.934.)

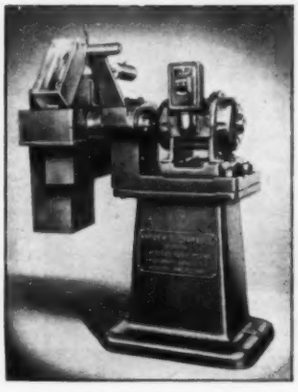
For cutting copper and other soft material a steel saw can be used in place of the abrasive wheel. The design of the wheel head and angle vise permits cutting at any predetermined angle. Coolant equipment can be furnished. The 10x$\frac{3}{32}$x$\frac{1}{2}$ in. wheel is protected with a heavy wheel guard. Wheel speed is 4,800 r.p.m. Vise jaws are 4½x1 in. and have a maximum opening of 1½ in.

Abrasive Cut-Off Machine, Tool Crib, No. 0

Andrew C. Campbell Division of American Chain Co., Bridgeport, Conn. (Vol.80,p.972.)

The No. 0 Tool Crib wet abrasive cut-off machine will cut solid bars up to ⅝ in. square or round and tubing up to 1¼ in. diameter. Hardened steel is cut without discoloration or drawing the temper.

The disk can be used either wet or dry and amount of coolant used is readily adjusted. This model handles the coolant without the use of a pump. Cutting disks up to 12-in. diam-

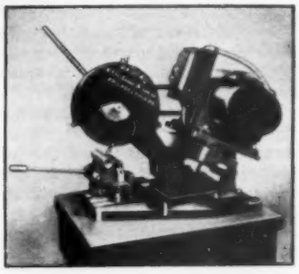


eter and $\frac{1}{16}$ to ⅛-in. thick can be used. Floor space, 30x31 in.; net weight, without holder extensions, is 410 lb.

Abrasive Cut-Off Machine, "Radiac," Type F

A. P. de Sannon & Son, 1615 McKean St., Philadelphia, Pa. (Vol.80,p.938.)

The Type F. model occupies a 20x30-in. bench space and is 20 in. high. It uses a 10x$\frac{3}{32}$x$\frac{5}{8}$-in. bakelite bond or a 10x$\frac{1}{16}$x$\frac{5}{8}$-in. rubber bond wheel, and oper-

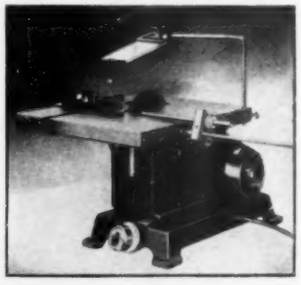


ates at 13,000 surface ft. per min. cutting speed. Solid metal stock up to ¾ in. diameter can be cut to size with a good finish. Metal tubing and fibrous materials up to 1¼ in. diameter may also be cut.

Abrasive Cut-Off Machine

Challenge Machinery Co., Grand Haven, Mich. (Vol.80, p.976.)

A capacity for any metal up to 1 in. thick is provided in this abrasive cut-off machine. The 15x14-in. table is adjustable. Gages are conveniently located and are easily adjusted. A 6x$\frac{1}{32}$x½ in. elastic cut-off wheel is furnished.



Bandsaw and Filing Machine, 18 In.

Continental Machine Specialties, Inc., 1301 Washington Ave. S., Minneapolis, Minn. (Vol.80, p.354.)

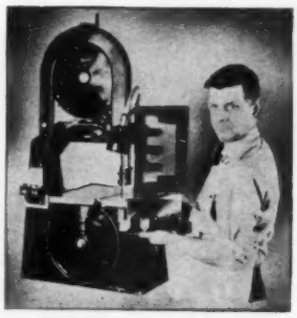
This 18-in. throat model has a work table 21x21 in. A third idler pulley is employed on the abrading band, when doing jobs of unusual size so as to provide clearance for the work. Band files, narrow bandsaws or emery cloth bands can be used.

Speed of the band is infinitely variable from 75 to 400 ft. per min. An air pump furnishes a jet of air at the work.

Bandsaw and Filing Machine, Bench

Continental Machine Specialties, Inc., 1301 Washington Ave. S., Minneapolis, Minn. (Vol.80, p.391.)

This 12-in. throat machine operates at 140 ft. per min. and the capacity is material up to 6 in. thick. A saw blade only 3/32 in. wide is employed, and link file bands or emery cloth bands can be substituted.



Bandsaw, Deep Throat

Continental Machine Specialties, Inc., 1301 Washington Ave. S., Minneapolis, Minn. (Vol.80, p.784.)

An extra deep-throat bandsaw, known as the "JXD", has a table area of 22x30½ in. and a throat depth of 25 in. The third idler wheel is tiltable, and the main upper wheel likewise, to permit easy and exact tracking of the blade. For band filing, an extension section is coupled into the standard "Doall" file band to get the extra length for this model.

Bandsaw, Type S14

Grob Bros., Grafton, Wis. (Vol.80,p.524.)

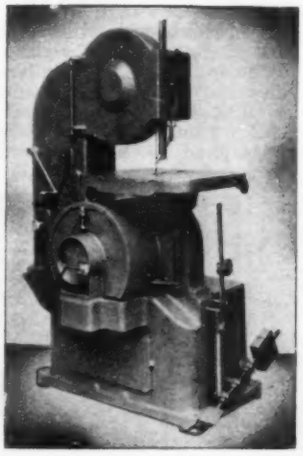
Any standard metal band from ⅛ to ½ in. wide is inserted in an opening for internal sawing. The band is then joined on the brazing device, mounted on the machine and the weld is ground to the proper thickness with the grinder furnished. Ex-

ternal sawing can also be done. Throat depth, 14 in.; table, 14x 14 in.; height of table from floor, 45 in.; net weight, 360 lb.

Bandsaw, Type OS20

Grob Bros., Grafton, Wis. (Vol.80,p.562.)

A saw band 140 ft. long is wound helically on a 20-in. drum. Bands with a thickness from 0.025 in. to 0.050 in. can be used, permitting fast cutting of sharp curves. Cutting speeds of 50, 75, 100 and 150 ft. per min. are permissible for saw bands, and the reverse speed is 500 ft. per min. A half minute is required for set-up on internal sawing of dies, stripper plates and miscellaneous parts. Sawing table, 24x28 in., tilts in two directions. A slide is connected with a feeding device operated by an adjustable weight.



Bandsaw, 18 In.

Oliver Machinery Co., Grand Rapids, Mich. (Vol.80,p.564.)

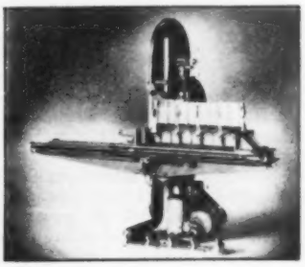
Table has a miter cut-off gage and a parallel cutting fence. By using gages it will cut parallel up to 11 in. wide

and will cut off and miter up to 6½ in. wide. The table tilts 45 deg. to the right. Capacity of machine, 18 in. between saw and column, 9 in. under the upper guide and saws up to ¼ in. wide. Table surface is 24 in. wide by 20 in. long.

Bandsaw, Type JM30

William Laidlaw, Inc., Belmont, N. Y. (Vol.80,p.1056.)

Type JM-30 metal cutting bandsaw has a double-cylinder hydraulic speed and is designed especially for cutting cylinder blocks for inspection purposes. It has a 30-in. diameter wheel, an 18 x 8 in. table and a 40-in. carriage travel. Floor space, 5 x 8 ft., weight, 2,000 lb. A 16-ft., 1-in. wide saw blade, having 10 teeth per inch, is used.



Improvements for Bandsaws

Continental Machine Specialties, 1301 Washington Ave. S., Minneapolis, Minn. (Vol.80, p. 602.)

A power work feed adaptable to precision sawing requirements is now furnished with the "Doall" bandsaw. Power is obtained from a spring motor built in the base and feed pressure is controlled by a pedal.

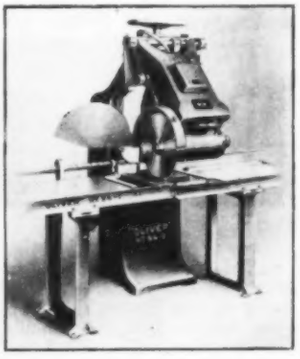
An inside and outside circle cutting device consists of a slidable plate set into the work table and having a series of tap holes for center pivots. Work revolves on these centers and the table adjusts the offset of any desired distance from the saw.

A three-power magnifying glass is now furnished for use on intricate and exacting work with precision narrow blade saws.

Circular Saw, "Straitline"

Oliver Machinery Co., Grand Rapids, Mich. (Vol.80,p.673.)

Either a steel saw or an abrasive disk can be applied to the "Straitline" cut-off saw, which is designed for cutting steel and other metals. The machine is built in two models, one for straight right-angle cuts only, and the other with a swivel column to make angular cuts up to 45 deg. right

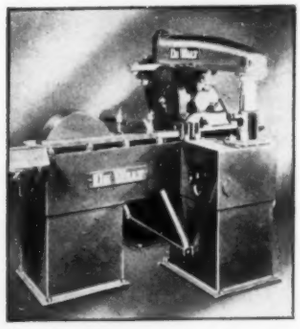


and 15 deg. left. Light-gage steel sections, having a maximum height up to 4½ in., may be cut off when using an 18-in. metal saw.

Circular Saw for Light Sections

De Walt Products Corp., Lancaster, Pa. (Vol.80,p.838.)

A semi-automatic machine for sawing light-section material. After material is manually started into the feed jaws, it is automatically pushed against a length stop, clamped simultaneously on both sides



of the saw kerf by a four-jaw automatic vise and then cut off. The saw then draws back, the stop lifts, the stock feed mechanism pushes another section of the material into the vise, and the process is repeated.

This machine will cut off light-wall tubing 2 in. in diameter and 6 in. long. Length of material fed ranges from 4 to 13 in.

Cutting-Off Machine, Tubing

Modern Machine Tool Co., Jackson, Mich. (Vol.80,p.253.)

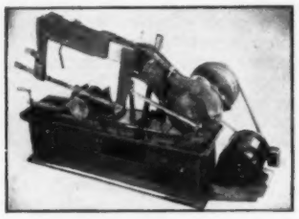
This 4½-in. cutting-off machine is equipped with a double live-roller feed, operated from the collet control lever. Because of its cam action, only a slight pressure is required to feed any length of stock through the machine until it strikes the stop. The machine is equipped with double, cam-actuated tool-slides, each of which has an independent screw adjustment.

The base of the machine is of welded construction, and all moving parts are fully protected with suitable guards. With the two motors and all equipment, the machine weighs 2,540 lb.

Hacksaw, Power

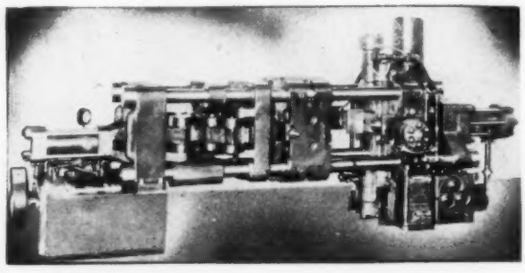
Kelley Gear & Tool Co., 1406 W. State St., Bristol, Tenn. (Vol.80,p.1024.)

This 10x10 in. power hacksaw of the gravity-feed type has a return-stroke relieving mechanism operated by a cam, rack and pinion and friction clutch. Speeds of 80, 100, and 126 strokes per min. are obtained by shifting the V-belt on the sheaves. A one-speed belt-drive model is also available.



A planetary gear reducer, having case hardened gears operating in an oil bath, is located in the drive sheave.

Die-Casting Machines



Die-Casting Machines, Brass

Reed-Prentice Corp., Worcester, Mass. (Vol.80,p.175.)

Two fully hydraulic, high-pressure die-casting machines have dies provided with automatic ejection of the castings, and die plates are finished on four sides for fitting core-pulling attachments. Both sizes have die openings of 12 in.

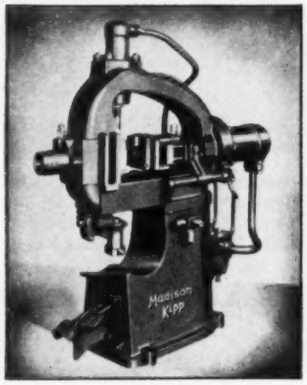
Model 2G for pressures to 10,000 lb. per sq.in. has die plates of 32x37 in. and space between bars of 18x21 in. Maximum and minimum die spaces are 24 and 8 in. The Model 8G for pressures up to 50,000 lb. per sq.in. has die plates of 39x42 in. a 20x22 in. space between the tie-bars, a maximum die space of 17 in. and adjustment of the movable die plate of 12 in.

Die-Casting Machines, Brass

Madison-Kipp Corp., Madison, Wis. (Vol.80,p.1056.)

Equipment is now available for casting brass and rigid-analysis aluminum by the high-pressure method of casting metal in the plastic state. The line consists of three machines, five sizes of hydraulic pumping units and electric melting furnace. All three machines are fully hydraulic.

Model 256 casting machine, shown here, provides line pressures up to 2,500 lb. which in turn provides a die-holding pressure of 30,000 lb., and 7,700 lb. per sq.in. for the standard-diameter, metal-forcing plunger.



Die-Casting Machine, Automatic, No. 8

Madison-Kipp Corp., Madison, Wis. (Vol.80,p.636.)

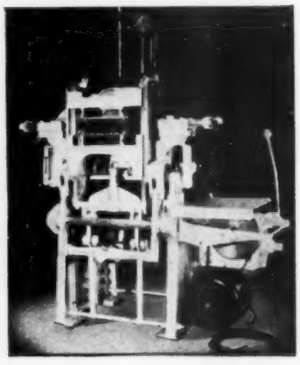
This No. 8 machine, built for large casting work, has a goose-neck capacity of 25 lb. in zinc alloy and a metal-pot capacity of 1,200 lb. Zinc, aluminum, lead and tin are handled. The cross head is equipped with four air cylinders and in the closed position wedges are actuated by the cylinders to provide a solid lock for the movable die carriage. Core-pulling devices can be applied. Length of machine is 204 in.; width, 72 in.; height, 82 in.; weight, 30,000 lb. Size of the machine is 22½x28½ in.

The reciprocating action, which opens and closes the dies and which provides the proper dwell period for shooting the casting, is accomplished through a dwell crank cam unit. The combination bars on which the core-pulling cams are mounted may be placed at various positions on top of the machine and two or more of these bars can be used at one time.

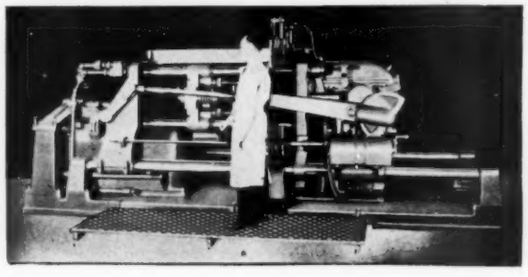
Die-Casting Machine, Model B-3

Kux-Lohner Machine Co., 2145 Lexington St., Chicago, Ill. (Vol.80,p.745.)

This vertical die-casting machine has a split sprue fill which is particularly adapted to parts requiring long inserts such as lead battery terminals and golf heads. Plunger pressure up to 1,500 lb. per sq.in. is supplied by means of a long compression spring. Die space between bars is 14 in. by 12 in. wide. Die



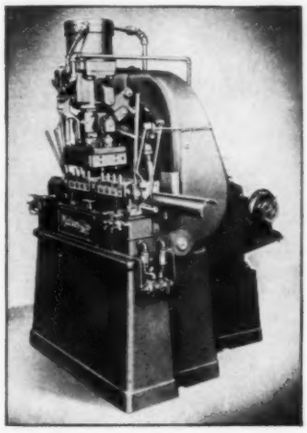
thickness, both halves, can be up to 7⅛ in. Volume of metal per shot, including the gate is 5½ lb. in lead-base alloy or 3¾ lb. in zinc-base. Cores can be pulled automatically from three sides of the die. Adjustable ejector mechanisms can be mounted in the upper and lower die-holder members. The machine is fitted for the general run of die-cast parts in either single- or multiple-cavity dies.



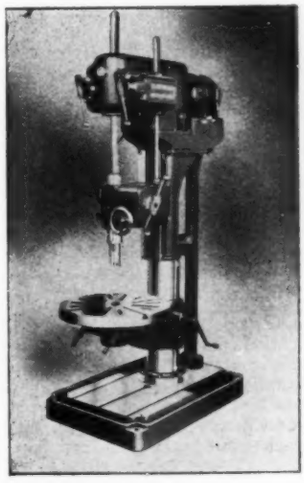
Die-Casting Machine, Lead or Zinc

Madison-Kipp Corp., Madison, Wis. (Vol.80,p.32.)

This special-purpose machine die-casts lead or zinc alloy parts on inserts, such as cables or rods. The traveling table is equipped with two sets of multiple-cavity lower die halves, while the ram has one mating upper die half. While castings are being made in the left-hand die, the right-hand die is open so that the operator is free to place a full set of inserts quickly and handily. Weight, 5,800 lb.; length, 62 in.; width, 60 in.; height, 74 in.



Drilling Machines



Drilling Machine, Vertical

Bryant Machinery & Engineering Co., 400 West Madison St., Chicago, Ill. (Vol.80,p.318.)

Improved "Cleereman" all-geared, anti-friction bearing, automatically oiled sliding-head drilling machines have nine feeds ranging from 0.005 to 0.045 in. Twelve spindle speeds are provided and these can be made in two ranges 50 to 1,000 and 75 to 1,500 r.p.m. They are furnished in round-column type and in sizes of 21, 25 and 30 in. They can also be made in gangs of from two to six spindles.

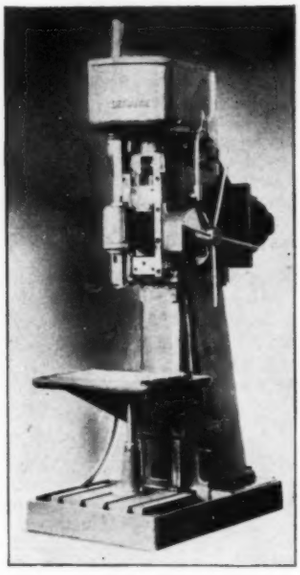
Drilling Machine, Vertical

Defiance Machine Works, Defiance, Ohio. (Vol.80,p.635.)

Designed as a single-purpose machine for continuous operation in production lines, this No. 200 production drill has the flexibility of a general-purpose machine. Any one of twelve speeds and sixteen feeds is quickly available by transposition of gears when changes in product or material are made.

Multiple-spindle heads may be attached to the lower side of the spindle-bearing housing.

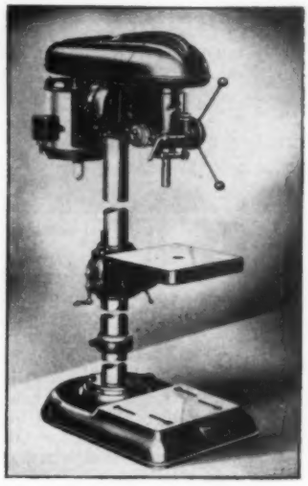
Specifications: Capacity of high-speed drill in steel, 2 in.; distance center of spindle to column face, 13¾ in.; spindle travel, 12½ in.; number of spindle positions on slide, 3; maximum distance spindle nose to top of table, 39 in.; working surface of table, 18 to 24 in.; vertical adjustment of table by jack screw, 18 in.; weight, 4,700 lb.

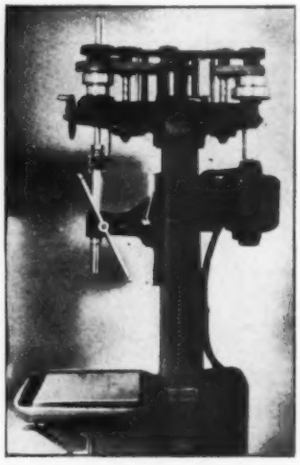


Drill Press, Column-Type

Delta Mfg. Co., 620 E. Vienna Ave., Milwaukee, Wis. (Vol.80,p.1094.)

Delta 17-in. column-type drill presses have a 3½-in. column and are available with either a floor base or a bench-type base. Maximum capacity is ¾-in. in cast iron. Machine heads can be used as units to build up special drilling machines.





Drilling Machine, Sensitive

Foote-Burt Co., Cleveland, Ohio. (Vol.80,p.745.)

A new motor drive arrangement has been applied to the "Sipp" line of sensitive drilling machines. The drive consists of a standard, foot-mounted, ball-bearing motor mounted on a bracket at the rear of the column. The motor shaft is connected to the rear cone pulley by means of a flexible coupling, making a compact drive. Three spindle speeds of 1,035, 1,725 and 2,915 r.p.m. can be obtained by shifting the speed lever. Size BK has capacity of ⅜-in. in cast iron.

Drilling Machine, Radial

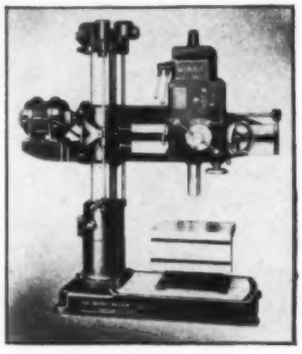
American Tool Works Co., Cincinnati, Ohio. (Vol.80,p.523.)

The "Hole Wizard" radial drills are available in 9- and 12-speed models, each with a 9-in. column. The 9-speed model has a 3-hp. motor and is furnished with either a 3 or 4 ft. arm. It has the following capacities: 1¼-in. in cast iron, ¾-in. in steel and a ¾-in. tap in steel. The 12-speed model is furnished with a 3-ft. arm, only, and has a 5-hp. motor. The capacity of this model is: drilling in cast iron, 2 in.; in steel, 1⅜ in.; and tapping in steel, 1½ in. The speed range of either model may be changed to suit a variety of requirements.

Drilling Machine, Radial

Morris Machine Tool Co., Cincinnati, Ohio. (Vol.80, p.526.)

The "Mor-Speed" radial drill has centralized control and is designed for high-speed drilling, facing, boring and tapping operations. It has a 9-in. column and is available with either a 3- or 4-ft. arm mounted on ball bearings. Speed and feed changes are located in the head,

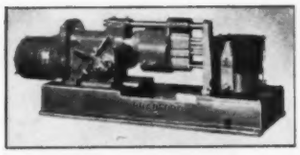


and changes are made through selective sliding gears on fixed centers. Direct-reading index plates are placed directly at the speed and feed change levers. A graduated dial depth gage, for setting drills, has a direct-reading plate.

Drilling Machine, Special, Horizontal

Bradford Machine Tool Co., 657 Evans St., Cincinnati, Ohio. (Vol.80.p.530.)

A bench-type, semi-automatic, five-spindle drilling machine was built to drill 45 holes in a Textolite bucket for rayon spinning. Holes are located in nine groups of five holes each, spaced equally around the periphery of



the bucket. Four of the holes in each group are No. 55 and one is No. 48. The holes are drilled in nine drilling cycles with automatic indexing. The machine then stops automatically for reloading. The machine cycle requires 45 sec.

Drilling Machine, Special, Horizontal

Langelier Mfg. Co., Providence, R. I. (Vol.80,p.603.)

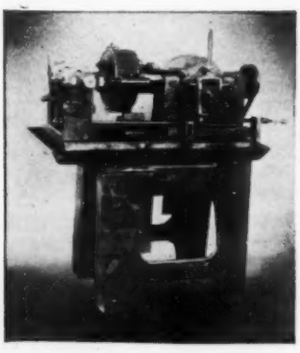
The company makes four different machines for drilling six holes with centers ranging from $\frac{27}{32}$ to $1\frac{5}{16}$ in. pitch circle. Bench space occupied is 30 in. front by 11 in. deep and the over-all height is 9 in. The machine

illustrated drills seven holes in the tops of plastic novelties. Six of the holes are equally spaced on a circle $\frac{1}{4}$ in. in diameter and the seventh hole is drilled in the center. The drills are $\frac{3}{32}$ in. diameter. The driving spindle is mounted on ball bearings. The drilling spindles are of the crank type mounted on fixed centers.

Drilling Machine, Special, Horizontal

Langelier Mfg. Co., Providence, R. I. (Vol.80,p.600)

The special semi-automatic drilling machine illustrated was built for drilling chain bars. The machine consists of a No. 31 automatic motor-driven drilling unit equipped with a multiple-spindle head. Two interchangeable heads are provided. The first head drives 40 $\frac{1}{8}$-in. drills spaced on two rows approximately $\frac{3}{16}$ in. apart, the spindles being located on $\frac{13}{32}$ in. centers. The second head drives



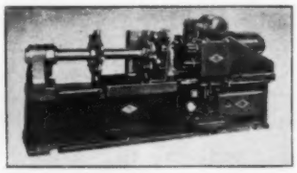
50 drills with spindles on $\frac{3}{8}$ in. centers. Indexing is automatic from a cam on the main control shaft of the drill unit. Floor space, 3x4-ft.; height, 45-in.

Drilling Machine, Special Horizontal

Rockford Drilling Machine Co., Rockford, Ill. (Vol.80,p. 316.)

This automatic horizontal drilling machine is equipped with a five-station fixture and tooling for work on the flange of a large crankshaft. It loads and unloads workpieces; drills six holes, and mills out the center of the flange; drills two locating holes; countersinks six holes, and reams two locating holes, and taps six holes. For this work, 23 cutting tools operate simultaneously. The hydraulic circuit is used for tapping.

On the right-hand end of the bed is mounted a traveling head

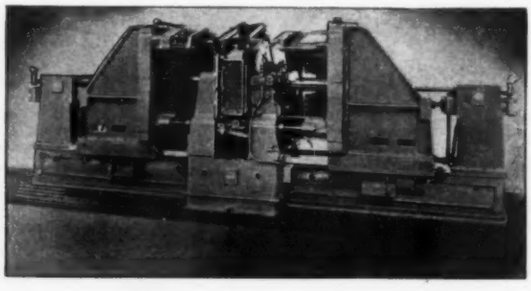


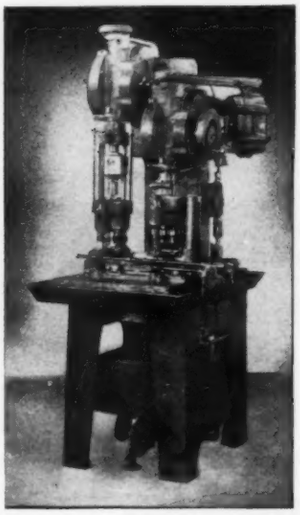
having automatic hydraulic cycle of rapid approach, feed, dwell for fine finish on milling and countersinking, rapid return and stop. The head has one main driving motor, and another for driving the group of tapping spindles independently. The second motor reverses automatically.

Drilling Machine, Special, Multiple-Spindle

Baush Machine Tool Co., Springfield, Mass. (Vol.80,p. 904.)

This multiple-spindle drilling machine finishes from the rough all valve and tappet holes and core drills the thrust and four water holes in a six-cylinder engine block. Production capacity is 55 to 60 blocks per hour. The right-hand, fixed center head contains 48 spindles and the left-hand, fixed center head has 40 spindles. The five-station trunnion fixture is hydraulically indexed. The machine is operated by push-button control and is electrically interlocked. Weight is 73,000 lb.





Drilling and Tapping Machine, Special, Vertical

Langelier Mfg. Co., Providence, R. I. (Vol.80,p.393)

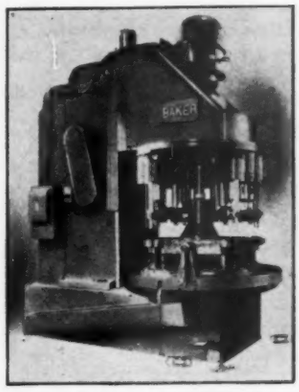
Two standard No. 21 automatic drilling units are mounted on a vertical column, each driven by individual motors. One has a six-spindle attachable multiple drillhead the other a six-spindle attachable multiple tapping head with a reversing mechanism. The fixture is adjustable, so that work requiring four, five or six holes can be drilled and tapped. The work is loaded into a vertical magazine and fed progressively through the drilling and tapping stations.

The drilling unit controls the cycle of the machine, which is equipped with a cam for indexing. After this head is started in motion it operates a trip dog which feeds the taps through the work. Adjustable collets are used to allow for grinding drills.

Drilling Machine, Five-Station

Baker Bros., Inc., Westlake & Post St., Toledo Ohio. (Vol.80,p.527.)

The Baker No. 60 H.O. five-station core drilling machine has 30 in. ways, a long saddle and a large size head with extreme overhang. The machine has a coarse boring feed with automatic change to fine feed



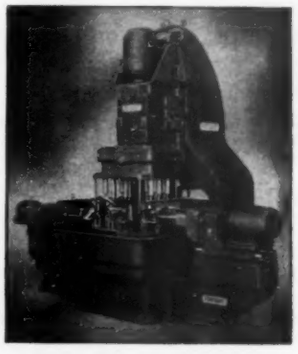
for facing, and a positive stop allowing several revolutions before tripping the reverse feed. This assures a square-faced surface. A simplified hydraulic rapid traverse is incorporated in the design.

One right and one left tractor link are machined in each cycle. Chucking is done while the tools are cutting. In each piece two holes are core-drilled and reamed, and a large hole is rough and finish counterbored.

Drilling and Tapping Machine, Special

Foote-Burt Co., Cleveland, Ohio. (Vol.80,p.937.)

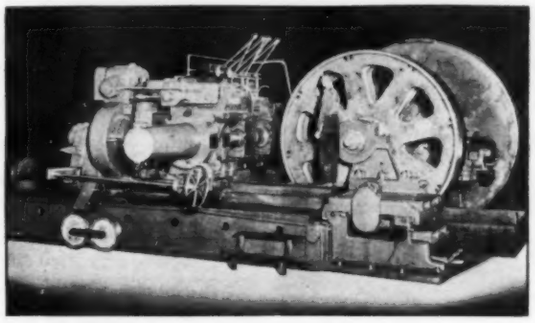
Drilling, chamfering and tapping operations on an automotive part are performed by this four-way, 25-spindle, combination drilling and tapping machine. The four heads are individually motor driven, and each unit performs its indi-



vidual cycle and returns to the starting position, remaining there until restarted. The upper, the left-hand and the rear heads are mounted on hydraulic-feed drilling units and the right-hand head is mounted on a lead-screw tapping unit. Each position of the fixture locates and clamps three pieces.

The upper head performs three operations on each part: drilling at the second station, boring at the third station and line reaming at the fourth station. The work-holding fixture is mounted on a four-position, circular, indexing table.

Gear Cutting and Finishing Machines



Gear Generator, Farrel-Sykes

Farrel-Birmingham Co., Inc., Ansonia, Conn. (Vol.80,p.974.)

Two large gear generating machines have been shipped to Russia. Each machine is capable of cutting practically every known type of gear that operates on parallel axes. One of the units will cut gears to approximately 26 ft. diameter with a maximum face width of about 5 ft. and a maximum of 6.18 in. circular pitch. The other machine has the same capacity, except that its diameter capacity is approximately 20 ft. These gear generators are also capable of cutting pinions of small diameter without additional attachments.

Gear Generator, Enveloping Type

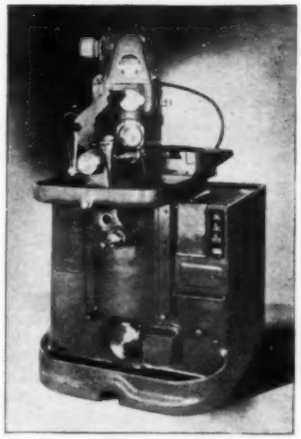
Fellows Gear Shaper Co., Springfield, Vt. (Vol.80,p.742.)

Designed for finishing spur and helical, internal and external gears, this gear generator employs principles that differ in several respects from the well-known gear shaper method. The tools used are made without any outside angle or side clearance to the teeth, and instead of being geared in harmony with the work, drive the latter. The enveloping generating tool is kept in intimate contact with the work at the same time that it is being rotated at high speed accompanied by a comparatively slow reciprocating movement.

The tool is simple in design, as it comprises only four members, two cutting and burnishing members, a spacing collar and a holder. Sharpening is easily accomplished. Owing to the way the tool is applied to the work, it is possible to operate it at high speed without detriment to the tool. Speeds as high as 1,000 ft. per min. can be employed.

An excellent finish results, as the tool can be fed slowly back and forth across the gear to remove the necessary amount of material and to obtain the desired finish, and yet consume a comparatively short time. The teeth of the gear can be reduced in thickness approximately 0.002 in. per traverse cycle, and if the gear is roughed to commercial limits, one complete traverse cycle is usually sufficient. An 8-pitch gear of 2 in. pitch diameter, 1 in. face width, can be finished to a high degree of accuracy in 25 sec.

This machine is made in two



sizes, one designated as No. 4 having a maximum capacity for gears up to 5 in. pitch diameter, 1¾ in. face width, 7 D.P., and a maximum helix angle of 45 deg.; the other designated as No. 8 having a maximum capacity up to 8 in. pitch diameter, 2½ in. face width, 4 D.P., and a maximum helix angle of 45 deg.

Hobbing Machine, Spline and Pinion

George Scherr Co., 128 Lafayette St., New York, N. Y. (Vol.80,p.356.)

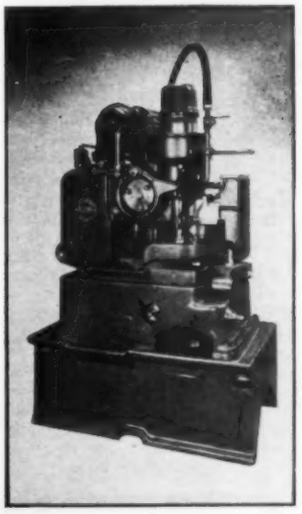
Heavy-duty Reinecker spline and pinion hobbers are available in three different sizes of diameter and pitch capacity. The machines have been designed for

either large- or small-lot production, by providing a number of standard or extra attachments. The cutter-head can be swiveled in vertical plane. Accurate angular setting is obtained by circular scale and vernier. A special cutter-head for thread milling is available.

Gear Shaper, Gap-Type

Fellows Gear Shaper Co., Springfield, Vt. (Vol.80,p.213.)

This is a special gear shaper, designed to use the gap-type cutter for rough and finish cutting of external spur and helical gears in one operation. The gap in the cutter permits load-



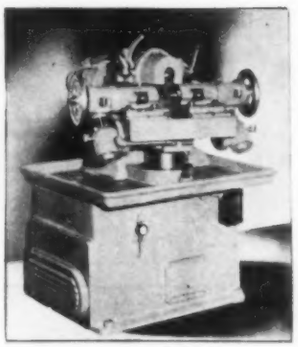
ing and unloading the work without withdrawing the cutter from the work.

The machine differs from the regular gear shaper in that it is arranged with electrical control for timing the rotation of the cutter-spindle. Maximum capacity is about 2½ in. pitch diameter, 6/8 diametral pitch.

Chamfering Machine, "Rutac"

W. C. Lipe, Inc., 208 S. Geddes St., Syracuse, N. Y. (Vol.80,p.1020.)

The "Rutac" rotary, universal chamfering machine is designed for chamfering the acute angle at the ends of the teeth of helical gears and pinions, spiral bevel gears and pinions and the sharp corners of the ends of spur gear teeth. It is a high production machine, capable of chamfering 300 to 600 teeth per min.

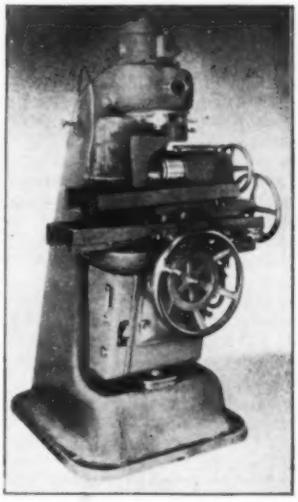


Gears having from 12 to 48 teeth of 4 to 20 D.P. and up to 2 in. face width can be handled. Maximum gear diameter is 8 in., minimum is 1 in. with bore and smaller with shank. Floor space, 40x44 in. weight, 3,660 lb.

Crowning Machine, Gear

National Broach & Machine Co., Shoemaker & St. Jean St., Detroit, Mich. (Vol.80,p.174.)

This automatic machine crowns the teeth of internal transmission gears for automobiles. It is designed to produce a crowned surface to offset any possible misalignment of shafts and to relieve edge pressures



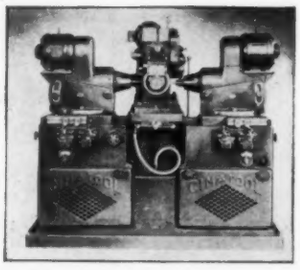
caused by the small planet gears.

"Crossed - axes" shaving is employed. Chordal thickness of the teeth varies 0.001 in. from the ends to the middle. No burnishing of gears is required when finished on this machine. Production is at the rate of about 30 gears per hour.

Chamfering Machine, Gear Tooth

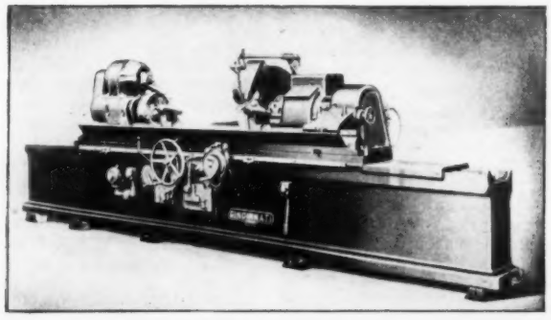
Cimatool Co., E. Third at June St., Dayton, Ohio. (Vol. 80,p.351.)

The double-spindle model of the "Peerless" gear-tooth chamfering machine is hydraulically



operated. It chamfers and burrs all external gears up to 13 in. in diameter, utilizing cutting speeds as high as 300 teeth per min. It permits chamfering of two teeth simultaneously on the same gear. The same flexibility as regards different shapes of chamfer and roundness is retained. The same timing mechanism is used as in the single-spindle models. Controls are conveniently placed.

Grinding Machines



Grinders, Cylindrical, Self-Contained

Cincinnati Milling Machine and Cincinnati Grinders, Inc., Marburg & South Sts., Cincinnati, Ohio. (Vol.80,p.1055.)

These plain, self-contained cylindrical grinders, for 14 and 16-in. maximum work diameters, are built in standard between-center lengths, ranging from 18 to 168 in. The radial bearings in which the wheel spindle is mounted are of the load compensating type and are equally effective for light or heavy work. Lubrication of spindle bearings is by pressure system. Net weights vary from 11,500 to 27,000 lb.

Grinder, Roll, Type 30

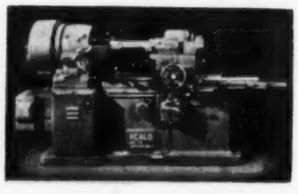
Landis Tool Co., Waynesboro, Pa. (Vol.80,p.974.)

The Type 30 roll grinder, weighing over 90 tons, has a 60-in. swing and will take 312 in. between centers. Headstock and footstock spindles are 12 in. in diameter. Grinding wheel spindle bearings are 6 in. in diameter and 14 in. long. Weight of the grinding wheel head unit is approximately 8 tons. The machine is equipped with nine electric motors, totalling 113¾ hp. Control is from an operating platform on the traveling wheel carriage and the contact between wheel and work is always in plain view. A crowning and concaving mechanism of the adjustable crankpin type is provided.

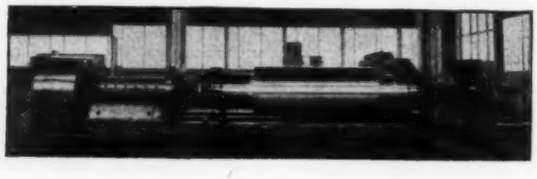
Grinder, Internal, Cylinder

Heald Machine Co., Worcester, Mass. (Vol.80,p.709.)

The No. 73 airplane cylinder grinder is designed to produce an exceptional finish, under commercial conditions, in grinding cylinders and sleeves. The



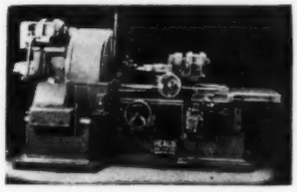
cylinders are readily inserted into the hollow workhead spindle, and are held in such a manner that the hole is at right angles to the attaching flange and concentric with the outside diameter of the skirt. Thus, the cylinder is ground in exactly the same position that it is held when finally assembled, eliminating cramping or misalignment.



Grinder, Internal, Adjustable Gap

Heald Machine Co., Worcester, Mass. (Vol.80,p.709.)

The No. 172 adjustable gap internal grinder handles gears, plates, connecting rods, housings and similar parts with medium-size holes but requiring a generous work swing. Holes up to 12 in. diameter can be ground. Grinding stroke can be ad-

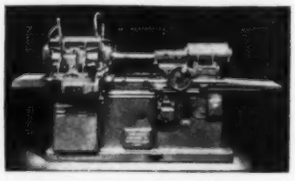


justed up to 15 in. The gap is adjustable for different lengths of work and the base is heavy and rigid. The workhead can be adjusted laterally to suit the length of work being ground. The hydraulic table drive operates at speeds from 0 to 32 ft. per min.

Grinder, Internal, Centerless

Heald Machine Co., Worcester, Mass. (Vol.80,p.817.)

The No 73 centerless internal cylinder grinder for grinding bores of large sleeves is identical with the airplane cylinder grinder, with the exception that a centerless unit replaces

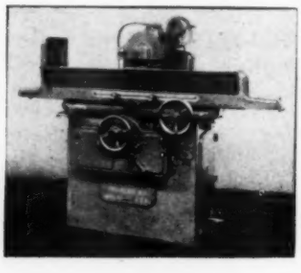


the conventional workhead. It will produce work to close tolerances, together with the best possible concentricity. The manual loading centerless unit is simple in handling and effective in operation.

Grinder, Surface, Series G-824

Diamond Machine Co., 9 Codding St., Providence, R. I. (Vol.80,p.355.)

The Series G-824 surface grinders may be used for production operations as well as



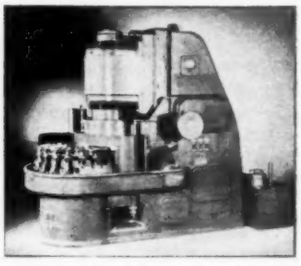
for tool-room work. They are equipped with hydraulic longitudinal and cross feeds. The longitudinal feeds are variable from 10 to 100 ft. per min. and are instantly adjusted by means of a single speed-control lever. The cross feed has a range from 0 to 0.125 in. at the end of each stroke.

Grinder, Surface, Rotary Table

Hanchett Mfg. Co., Big Rapids, Mich. (Vol.80,p.938.)

The No. 96-A rotary surface grinder for production grinding operations has a 30-hp., 900 r.p.m., fully inclosed, fan-ventilated motor supported by the one-piece column. Wheelhead can be raised or lowered by hand or by means of a power feed employing a 2-hp. motor.

The grinding wheel is 20 in.

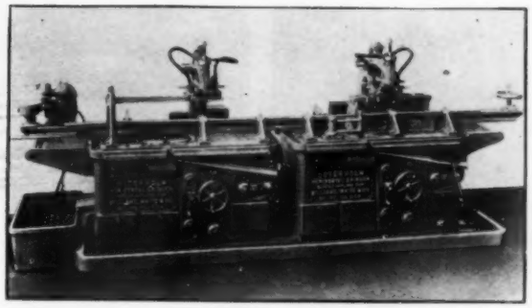


diameter, 3 or 4-in. high, with a 2- or 3-in. face. Wheel can be of either cylindrical or segmental type. Work table is 36-in. diameter.

Grinder, Disk

Oliver Machinery Co., Grand Rapids, Mich. (Vol.80,p.708.)

Circular work up to 15 in. in diameter and duplicating work up to 7 in. wide can be handled. This machine is economical for accurate grinding and finishing such pieces as segments, angles for built-up work, circular and taper work, and angle work in general. The disk is readily changed. Aloxite or emery cloth disks are used for metal grinding and polishing operations. The table is 9¾ in. wide by 21 in. long.



Grinder, Surface, Tandem Set-Up

Williams, White & Co., Moline, Ill. (Vol.80,p.352.)

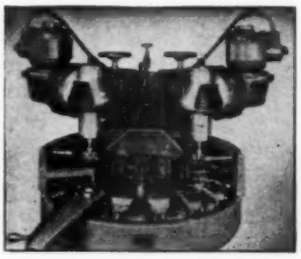
Several tandem set-ups of the Osterholm horizontal surface grinders have been installed in an automobile plant. The first machine takes a rough cut and the second a finish cut on a cylinder block. This tandem arrangement can rough and finish from 150 to 175 blocks an hour, with an accuracy of 0.003 in., when checked on a surface plate.

These grinders have tables consisting of the feed table, a circular plate support, and a take-off table. The ring-type wheel is set so it is flush with the top of the center plate, and the depth of cut is regulated by adjusting the height of the feed table relative to the wheel. Work passes from the feed table across the wheel to the center plate and the take-off table. It travels in a true plane, giving a flat surface. Either the weight of the work or a hold-down holds it against the wheel. Mechanical means feed it across the wheel at a uniform rate of speed.

Grinder, Surface, Automatic

Bergram Mechanical Engineering Co., New Britain, Conn. (Vol.80,p.1020.)

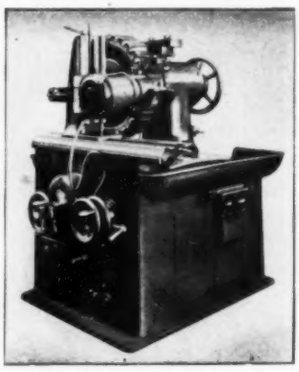
The Type DG-1 automatic surface grinding machine is designed for grinding small parts in large quantities. Magnetic or automatic chucks can be furnished to accommodate parts of any shape. Two diamonds are mounted on the rotating table to keep the roughing and finishing wheels dressed and insure consistent accuracy in predetermined sizes. It is not necessary to stop the machine during the working cycle.



Grinder, Cutter, Automatic

W. A. Schuyler, 250 W. 57th St., New York, N. Y. (Vol.80, p.69.)

The Collet & Engelhard automatic cutter-head grinder is distributed by the above concern. It is designed for grinding all milling cutters and inserted blade cutter heads, and will work on the face, on the side, and on the chamfered edge. Suitable for inserted square or round teeth and involute gear cutters. Feed is secured from



a spiral cam having a spiral lobe on one side and a smaller circular portion adjacent thereto. Adjustment of feed is obtained by means of a micrometer screw.

One model is for cutters from 4 to 16 in. in diameter, and the other is for cutters from 6 to 28 in. in diameter. The grinding head can be supplied with two speeds, 475 and 2,850 r.p.m. A spiral attachment for spiral-fluted cutters and a special device for grinding turning and planing tools can be provided.

Grinder, Cutter, Universal

Oliver Instrument Co., Adrian, Mich. (Vol.80,p.317.)

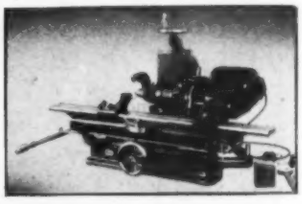
This tool and cutter grinder is fitted with a universal fixture having adjustments in all directions and arranged to hold a few simple tool clamping fixtures. The grinding wheel is reciprocated by a ram and is mounted on a vertical spindle. The work is directly in front of the operator and the tooth being ground is always in view.

Clearance is obtained by tilting the wheel to the desired angle by a direct-reading scale. The machine is driven by a ½-hp. motor and weighs approximately 1,000 lb.

Grinder, Tool, Bench

Union Twist Drill Co., Athol, Mass. (Vol.80,p.530.)

This No. 1 tool grinder is made for sharpening, on centers, straight or taper end mills and reamers with either straight or spiral flutes. It will take 21 in. between centers with a maximum distance of 8 in. between wheel and center, and will grind cutters of 3 in. diameter. The wheel spindle is of hardened and ground steel and runs in bronze boxes that are adjustable for wear. The wheel may be



mounted on either end of the spindle. The vertical adjustment of the spindle is ½ in. above or below center line of work. The wheel traverse is 2½ in., and is operated by a hand wheel in front of machine.

Grinders, Broach

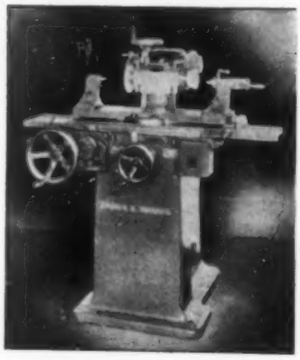
Colonial Broach Co., Detroit, Michigan. (Vol.80,p.596-7-8.)

Designed especially for broach sharpening, these grinders are provided with direct-driven spindles. Broach-driving headstocks are driven separately through a two-speed gearbox, eliminating all belts and pulleys. Model SFA-36 (left) is for sharpening surface broaches and Model SRA-72 (right) is for cylindrical broaches. Both types are designed to facilitate grinding the under-cut.

Grinder, Tool and Cutter, No. 10.

Brown & Sharpe Mfg. Co., Providence, R.I. (Vol.80,p.937.)

Low fixed height permits the operator to see the grinding wheel in contact with the work when at the natural position in



front of the machine. All table and wheel controls are easily reached from this position.

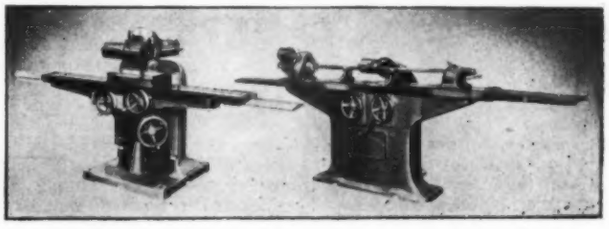
The machine will accommodate all the usual types and sizes of cutters. The centers will swing work up to 10 in. diameter by 20 in. long. Maximum longitudinal table travel by handwheel is 18 in. A 4-in. table reciprocation by hand lever is available anywhere in the 18 in. travel. Largest diameter ground on centers 6 in.

Grinders, Carbide-Tool

Carboloy Co., Inc., 2985 E. Jefferson Ave., Detroit, Mich. (Vol.80,p.393.)

This company is marketing two pedestal grinders for grinding cemented-carbide tools. They are suitable for tools dulled in ordinary use and the rapid reconditioning of carbide tools on which the tip has been broken. Milled and brazed tools can be rapidly shaped and ground. Two sizes are available, one with two 6-in. wheels and the other with two 10-in. wheels.

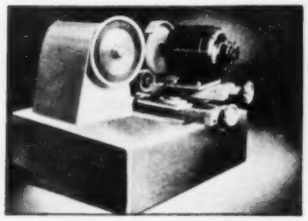
These machines are built for Carboloy by the Ex-Cell-O Aircraft & Tool Corp., Detroit, Mich., and are fully described on the next page.



Grinder, Circular-Knife

Samuel C. Rogers & Co., 191 Dutton Ave., Buffalo, N. Y. (Vol.80,p.1093.)

Made in two sizes, the circular knife grinder shown will sharpen single or double bevel knives or disks. Model CC-1 will grind knives to 14 in. diameter and the No. CC-2 ma-

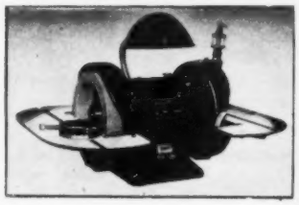


chine will grind up to 20 in. diameter. Knives are revolved by separate motor drives. The 6 x ½-in. grinding wheel is mounted directly on the arbor of a ¼-hp. motor and this is mounted on a double slide.

Grinder, Carbide-Tool

Thomas Prosser & Son, 15 Gold St., New York, N. Y. (Vol.80,p.30.)

The Widia Model "AA" cemented-carbide tool grinder is equipped with two quick-setting, slotted tables that have graduated indexes. Both rough and finish grinding operations can be performed with the cup



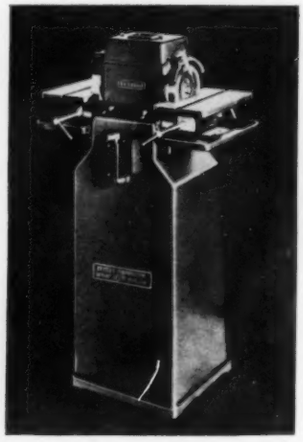
wheels which may be either fine-grain silicon carbide or diamond-impregnated. Other types of wheels can be supplied for grinding high-speed steel. An oil-feed attachment is furnished when diamond wheels are used. Standard equipment includes the lamp, a reversible motor and a combination wheel-dresser, holder and protractor.

Grinder, Carbide-Tool

Ex-Cell-O Aircraft & Tool Co., 1200 Oakman Blvd., Detroit, Mich. (Vol.80,p.218.)

The No. 48 grinder is designed for grinding all sizes of single-point high-speed steel and cemented-carbide tools. Peripheral grinding on straight type vitrified wheels and face grinding on cup type vitrified wheels is possible.

Adjustable tool tables have hardened and ground surfaces and are provided with a slot to guide the wheel dresser and angularly adjustable tool pro-

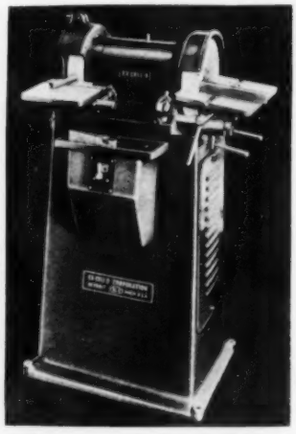


tector. Each table is adjustable up to 16 deg. above or below center and is provided with a graduated scale. Ten-inch diameter wheels are used.

Grinder, Carbide-Tool

Ex-Cell-O Aircraft & Tool Co., 1200 Oakman Blvd., Detroit, Mich., (Vol.80,p.352.)

No. 46 carbide tool grinder is designed for rapid, economical grinding and lapping of single-point, cemented-carbide-tipped turning, facing and boring tools. Diamond wheels, silicon-carbide, vitrified cup wheels or diamond lapping disks can be used.

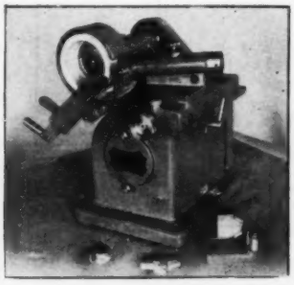


A graduated scale on each table affords an adjustment of 16 deg. above or below center. Each table has a 2-in. adjustment for wheel wear and to obtain correct rake and angle on the tools. Six-inch diameter wheels are used.

Grinder, Drill

Oliver Instrument Co., Adrian, Mich. (Vol.80,p.32.)

The No. 21 drill grinder is available for grinding small drills accurately with point angles varying from 80 to 180 deg. Shoulder drills may be ground on the shoulder as well as on the point. It can be arranged for grinding left-hand drills, also for grinding the thick-web type of oil-hole drills

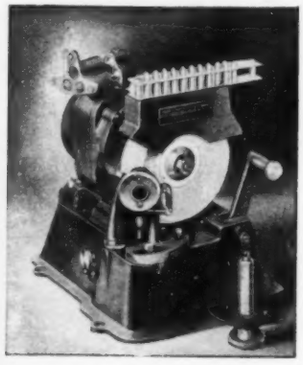


for crankshafts. Rated capacity is 3/32 to ½ in. diameter drills, but by means of a collet holder drills from 3/32 in. to No. 57 may also be ground.

Grinder, Drill

Black Diamond Saw & Machine Works, Inc., Natick, Mass. (Vol.80,p.901.)

This drill grinder accurately sharpens wire-gage and fractional-sized drills and requires no adjusting, regardless of the size of drill being ground. Drill lips are ground exactly the same length and the drill is given the proper angle and clearance to insure easy cutting. A thin



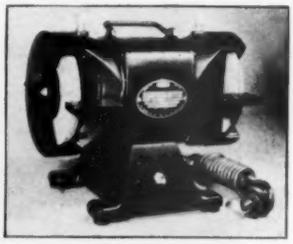
flange on the wheel is used for thinning the web of the drill.

Two sizes are available; No. 1 size grinds two-lip twist drills from No. 60 wire gage to 11/32 in. diameter. A special locator for drills No. 60 to No. 70 wire-gage can be furnished for the No. 1 size machine. No. 2 size grinds ⅛ in. to ½ in. diameter, inclusive, two-lipped straight shank and No. 1 Morse-taper shank drills. Either of these two machines can be made for left-hand drills and either can be mounted on a bench or pedestal.

Grinder, Bench

Brown-Brockmeyer Co., 1000 Smithville Rd., Dayton, Ohio. (Vol.80,p.31.)

Available in both ¼- and ⅓-hp. sizes, this ball-bearing grinder is capable of performing a large variety of grinding operations. One 6-in. coarse and one 6-in. fine wheel are mounted on the spindle. The carrying handle lies out of the way when not in use, and rubber foot pads are

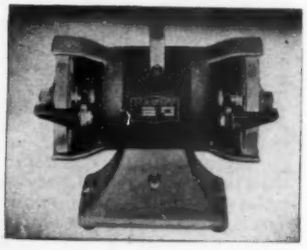


concealed in the base. A safety guide and tool-rest are built into the frame. The motor is fully inclosed and operates on 110-volt, 60-cycle, power through an extension cord.

Grinder, Bench

Baldor Electric Co., 4357 Duncan Ave., St. Louis, Mo. (Vol.80,p.320.)

The "Handy" portable ball-bearing grinder is powered with a ¼-hp. totally inclosed motor of the capacitor type. It operates at 3,450 r.p.m., and has no commutator, brushes or cen-

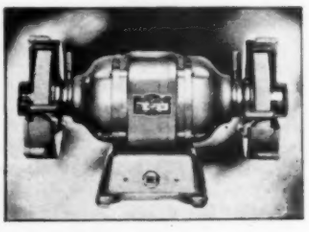


trifugal switch. Oiling is necessary only once a year. The two 6-in. wheels extend beyond the motor frame and the toolrests are adjustable.

Grinder, Bench-Type

Baldor Electric Co., 4357 Duncan Ave., St. Louis, Mo. (Vol.80,p.1058.)

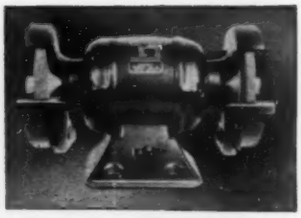
Type No. 3240 bench-type grinder is powered with a ½-hp. capacitor-type motor and has two 7 x 1 x ⅝-in. wheels. The motor frame is designed to provide clearance for grinding long or odd-shaped pieces.



Grinder, Bench Model BG66

Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago, Ill. (Vol.80,p.676.)

General grinding, polishing, buffing and wire-brush work can be performed on the Model BG66, 6-in. bench grinder. The



tool rest can be adjusted to various positions and heavy wheel guards are furnished. The free speed is 3,550 r.p.m.

Grinder and Buffer, Pedestal Type

Marathon Electric Mfg. Co., Wausau, Wis. (Vol.80,p.394.)

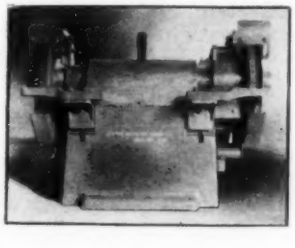
Available in ¾- and 1-hp. capacities and in single-phase, three-phase and d.c. models, these grinders and buffers have heavy wheel guards that meet all safety code requirements.

The guards are easily removed for wheel replacement. These units are furnished with or without pedestals. Toolrests are adjustable for wheel size and grinding angle.

Grinder, Floor, High-Speed

Ransom Grinding Machine Co., Oshkosh, Wis. (Vol.80,p. 675.)

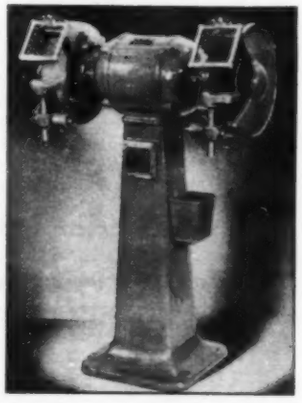
This floor-type grinder uses 24- or 30-in. high-speed wheels and has four changes of speed. Drive is by Texropes that can be replaced without disturbing the arbor. Speed changes are accomplished by changing the sheaves on the 15-hp. drive motor. The unit is so arranged that it is apparent from the front of the machine when the next larger size sheave should be put on to speed up the wheels.



Grinder, Floor

Jas. Clark, Jr. Electric Co., 600-640 E. Bergman St., Louisville, Ky. (Vol.80,p.897.)

This 2-hp. floorstand grinder has a totally inclosed motor that is mounted in heavy-duty precision ball bearings. The unit is equipped with pushbutton



control, overload protection, safety guards, non-shatterable glass eyeshields, toolrests, water pot and two 12 x 2-in. face by 1-in. hole wheels.

Grinders, Snagging, Heavy-duty

Hisey-Wolf Machine Co., Cincinnati, Ohio. (Vol.80,p. 1019.)

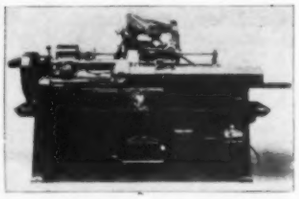
Four sizes and fifteen types make up this line of heavy-duty "Texdrive" snagging grinders. Single-spindle grinders, multi-speed grinders and two-spindle grinders with one or more

speeds are available in 5-, 7½-, 10- and 15-hp. sizes. Wheel guards and mounting brackets are of steel.

Grinder, Thread, Universal

Reed-Prentice Corp. Worcester, Mass. (Vol.80,p.389.)

The Newall automatic universal thread grinder is adapted to grinding taps, gages, dies, chasers, bolts and all precision



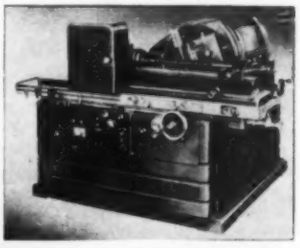
threaded work. Pitch error is controllable within 0.0001 in. The method employed is to take a series of light cuts at a high speed, a single-ribbed wheel being used for work such as thread gages. By this means strains in hardened work are released gently and consequent errors are corrected as they are released. A cam is provided for grinding relief on taps having straight or spiral flutes of any number.

The No. N.S.4 machine has the following specifications: maximum grinding length, 10 in.; maximum length between centers, 10 in.; maximum diameter ground, 3 in.; right or left helix obtainable, 4 deg. For the No. N.S.10 machine the specifications are: maximum grinding length, 20 in.; maximum length between centers, 36 in.; maximum diameter ground, 4 in.; right or left helix obtainable, 15 deg.

Grinder, Thread, Universal

Ex-Cell-O Aircraft & Tool Corp., 1200 Oakman Blvd., Detroit, Mich. (Vol.80,p.525.)

This universal precision thread grinder has a capacity for grinding external threads 8 in. diameter, 24 in. long on a maximum length of 33 in. between centers. It will also grind



internal threads on work having threads not smaller than 1 in. diameter, 1 in. long, up to 8 in. diameter, 3 in. long. Tapers up to 2 in. per ft. included angle can be ground. A lead tolerance of 0.0002 in. per in., when grinding U.S.S. threads, can be maintained.

The machine is automatic in all its grinding operations except for loading and unloading the work and withdrawing the grinding wheel at the end of the cut. It will grind to a predetermined size setting, and then automatically stop feeding; or it may be set so that the table will stop at any point of its travel. A lead-compensating device corrects the lead error caused by taper setting. A back-off attachment can be furnished.

Grinder, Thread, Automatic

Jones & Lamson Machine Co., Springfield, Vt., (Vol.80, p.634.)

The self-truing, self-sizing mechanism incorporated in the design of this automatic thread grinder keeps the wheel sharp throughout its effective life. This device requires no attention from the operator and does not disturb the size adjustment to which the wheel is set. The machine is fully automatic ex-

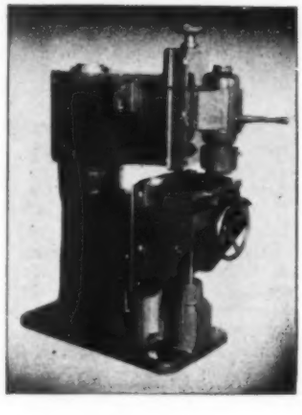
cept for work placement and removal, and withdrawing the wheel at the end of the cut.

The standard machine will grind up to 8 in. thread diameter and a maximum thread length of 9 in. This length of thread may be ground on any part of work 24 in. long. The machine will swing work 11½ in. maximum diameter with a maximum work length of 31 in. between centers, and will grind from the solid or from previously roughed threads. Single, double, triple, quadruple or sextuple threads can be ground.

Grinder, Bottle Mold

Hanchett Manufacturing Co., Big Rapids, Mich. (Vol.80,p. 566.)

The No. 700 swing-arm grinder has been developed for the glass-bottle industry, to be used for grinding off the tops of bottle molds. The 1½-hp., 3,600 r.p.m. motor is mounted on a vertical slide which has hand micrometer screw feed. The grinding cylinder is of the nut-inserted type and is 5 in. in diameter by 3 in. high by 3 in. center hole. The knee-type table has a hand-operated vertical adjustment.

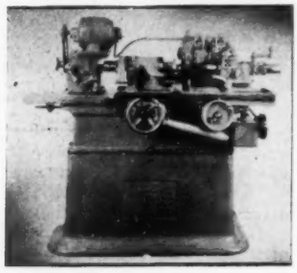


An 8 x 16 in. magnetic chuck is mounted on the table and there is an adjustment of 14 in. from the top of the 4-in. high chuck to the bottom of a new grinding cylinder. The grinding cut is taken by swinging the arm across the surface of the work by hand. Weight, 2,500 lb.

Grinder, Piston, Heavy-Duty

Van Norman Machine Tool Co., Springfield, Mass. (Vol. 80,p.180.)

The No. 101 machine finish grinds both straight and cam pistons. This machine can be

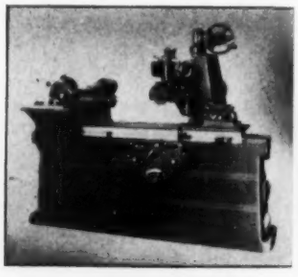


set up rapidly. Increased wheel and feed speeds contribute to its speed of operation. All ways are hand scraped, bearings are anti-friction and are designed for easy and accurate take-up for wear.

Grinder, Spline

Fitchburg Grinding Machine Corp., Fitchburg, Mass. (Vol. 80,p.67.)

Designed for grinding the sides of keys and the root diameter of spline shafts, this machine is automatically indexed. It will grind either straight or helical splines having a maximum helical rotation of 250 deg. and a maximum helical angle of



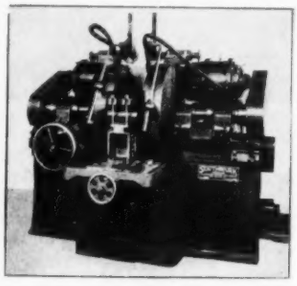
22 deg. Either right- or left-hand splines can be ground.

The headstock is motor driven and is automatically rotated between indexing for helical grinding. The table is hydraulically traversed with a maximum speed of 30 ft. per minute. Special index plates or a multiple-key index plate that will take 2, 3, 4, 6, 8 or 12 splines can be furnished. A truing device is available for "W" form wheels.

Grinder, Spring

Baldwin-Southwark Corp., Philadelphia, Pa. (Vol.80,p. 565.)

Parallel ends are ground on helical springs with this machine, also square surfaces can be ground any shape within its capacity. The machine consists of a grinding head with two motors driving 22 in. outside diameter by 14 in. inside diameter face wheels at the same constant speed. A power table



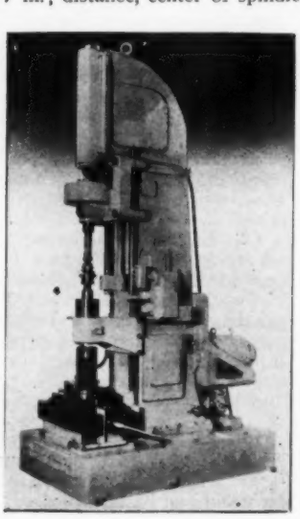
with adjustable stroke travels back and forth between the grinding wheels. The wheels revolve toward the operator and either a hand or mechanical feed adjusts the distance between the grinding faces.

Honing Machine, Vertical

Barnes Drill Co., 814 Chestnut St., Rockford, Ill. (Vol. 80,p.637.)

The No. 2610 full hydraulic honing machine will take cylinders from 3 to 10 in. diameter. It has variable-speed hydraulic transmission for spindle rotation that provides any speed between 100 and 250 r.p.m. Standard spindle travel is 20 in. and the machine will swing 26 in. The spindle carriage travels in ball bearings that run directly on hardened and ground vertical shafts which serve as a permanent durable track.

Specifications: height 11 ft. 7 in.; distance, center of spindle to face of column, 13¼ in.; maximum distance from top of table to nose of spindle, 56½ in.; spindle stroke, 1 to 20 in.; table surface, 17 x 30 in.; floor space, 47 x 75 in.; weight with 10-hp. motor, 7,050 lb.

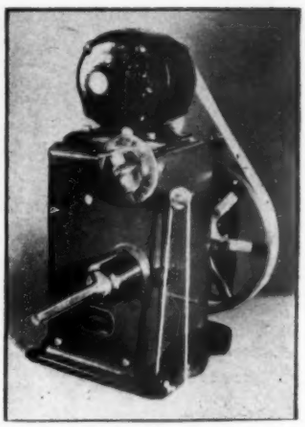


Honing Machine, Precision

Sunnen Products Co., 7900 Manchester, St. Louis, Mo. (Vol.80,p.639.)

This precision bench honing machine will grind, hone or lap any hole from 0.480 to 2.4000 in. diameter which has no keyway and which is not more than 7 in. long. Duplication of size is maintained by a micrometer stop graduated in 0.0001 in.

Mandrel revolution and stone feed-up are controlled by a pedal, allowing work to be removed from the mandrel when the pedal is released. When work is placed on the mandrel,



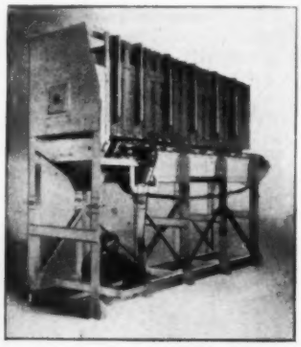
the grinding unit is brought back to a duplicate position by applying pressure on the pedal. The plane and position of the rough hole are maintained by full length and diameter contact in the hole.

Heat-Treating Equipment

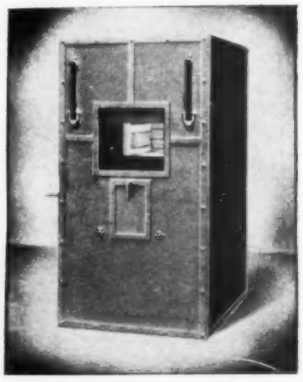
Furnace, Forging, Continuous

Surface Combustion Corp., Toledo, Ohio. (Vol.30,p.676.)

A continuous slot-type forging furnace, built to burn either gas or oil, was shipped to Russia to be used for heating motor valve rods. Conveyor speed is keyed to turn out 3,000 pieces per hour, equivalent to heating 870 lb. per hour in a heating cycle of 5 min. Rods ⅜ or ½ in.



diameter by 12 in. long are heated for 5 in. on the end to approximately 2,000 F. in preparation for upsetting the valve head. The conveyor is equipped with a variable-speed transmission to obtain a speed of 2 to ½ ft. per min. Heating length of the furnace inside is 10 ft., with a depth of 12 in. and a height of 16 in. in the combustion chamber. Work is carried through the furnace by a chain conveyor, and the rods pass through a discharge chute into the magazine box of the forging machine ready for the operator.



Furnace, Heat-Treating, Electric

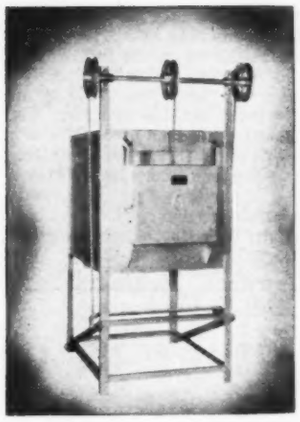
Hevi-Duty Electric Co., 4150 Highland Ave., Milwaukee, Wis. (Vol.80,p.179.)

These box-type electric heat-treating furnaces have metallic resistors of Smith Alloy No. 10 for 2,400 F., allowing high k.w. input for increased production. They will operate with either oxidizing or reducing atmospheres. Atmosphere control prevents outside air from entering the furnace chamber.

Furnace, Heat-Treating, Electric

Harold E. Trent Co., 618 N. 54th St., Philadelphia, Pa. (Vol. 80,p.317.)

The "H" line of electric furnace, is rated at 14 kw. 230 volts, single phase, and is capable of working up to temperatures of 1,850 F. Inside dimensions are 12 in. wide by 9 in. high by

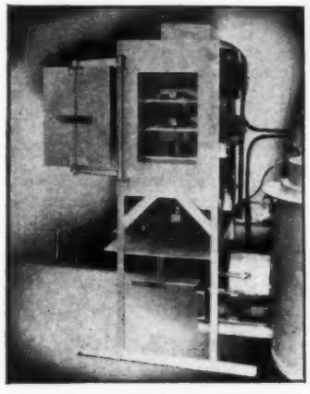


24 in. deep. The door is lifted by a treadle and can be locked in any position. Door structure and door locking are designed to make the furnace are- and heat-tight, and, without a sand seal.

Furnace, Tempering, Toolroom

Lindberg Engineering Co., 221 Union Park Court, Chicago, Ill. (Vol.80,p.1095.)

This box-type Cyclone furnace has been developed for tempering operations in the tool room. Air is driven through the electric heating



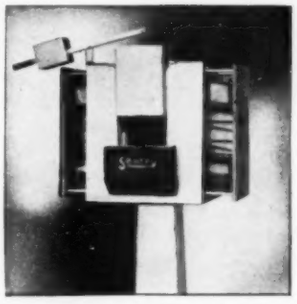
elements by a blower. Heated air passes down through the charge and returns to the fan through a perforated metal bottom plate. Several removable shelves are provided to hold small pots in the work chamber.

The door is of the plug type and is specially hinged so that when opened the hot face of the door is away from the operator. These furnaces are available in several sizes.

Furnace, Heat-Treating, Controlled Atmosphere

Sentry Co., Foxboro, Mass. (Vol.80,p.826.)

This No. 2, Model Y furnace has a muffle chamber 4½ in. wide, 4 in. high and 11 in. deep. It is designed for the clean heat-treatment of high speed steels.

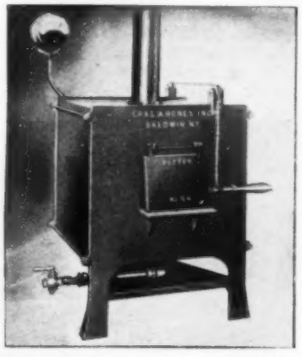


The conventional tungsten high-speed steels and molybdenum and cobalt types can be hardened. Controlled atmosphere causes the tools to come from the furnace with no scale, no decarbonization and no reduction in size.

Furnaces, Oven-Type, Gas-Fired

Charles A. Hones, Inc., Baldwin, L. I., N. Y. (Vol.80,p.827.)

With the addition of the Nos. 52 and 55, three sizes of bench-type oven furnaces are available. Temperatures are con-

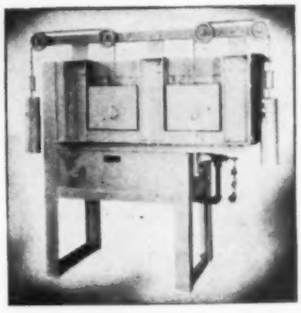


trolled by a single gas cock. A temperature of 1,400 F. can be reached in 15 min., 1,800 F. in 1 hr., and 2,000 F. in a little longer time. Specifications: No. 52 furnace: heating chamber; depth, 7½ in.; width, 4½ in.; height, 3 in.; gas consumption, 35 cu.ft. per hr. No. 55 furnace: heating chamber; depth, 17½ in.; width, 9½ in.; height, 8½ in.; hearth: 14½ in. long by 8½ in. wide; gas consumption, 90 cu.ft. per hr.

Furnace, Hardening, Gas-Fired

Philadelphia Drying Machinery Co., 3351 Stokley St., Philadelphia, Pa. (Vol.80,p.178.)

"P.D.M." single- and twin-chamber furnaces are equipped for gas or oil burners. Single-chamber model is used for production work in conjunction with a separate heat-treating furnace, while the twin-chamber model consists of a high-heat chamber and a pre-heat chamber. Combustion occurs beneath the hearth of the high-heat chamber, and hot gases enter the heating chamber over a low bridge wall and completely

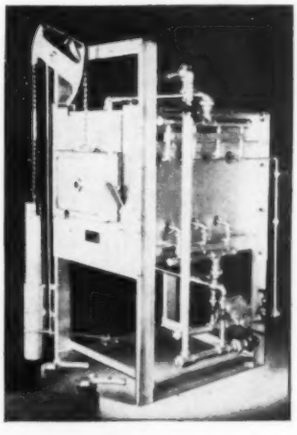


surround the work. Tight closing doors prevent air infiltration in both models.

Furnace, Oven-Type, Gas-Fired

American Gas Furnace Co., Elizabeth, N. J. (Vol.80,p.826.)

An improved method of firing is employed in this bottom vented oven-type furnace. Burners are provided in both top

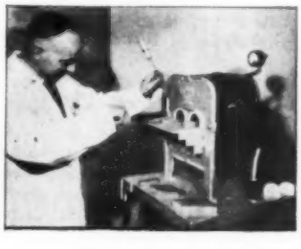


and bottom. By bottom venting, chimney action is eliminated and cold air cannot be drawn into the furnace when the door is opened. The atmosphere throughout the heating chamber consists of the products of combustion. When the mixture is properly set, the products of combustion will be such as to reduce scaling or decarburization.

Furnace, Brazing, Hydrogen

Firth-Sterling Steel Co., McKeesport, Pa. (Vol.80,p.528.)

The "Braze-Rite," an electrically operated hydrogen brazing furnace is designed for tipping sintered carbide cutting tools. Tools from small bits

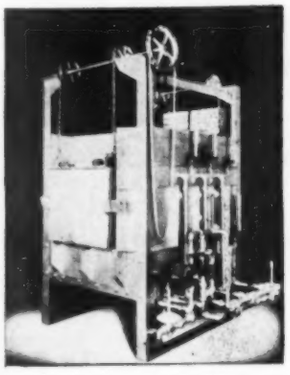


up to those with 1½ in. square shanks can be accommodated. Heat is localized where the carbide blank is to be mounted, eliminating the necessity of heating the entire shank. Brazing is done in a hydrogen atmosphere, preventing oxidation of the carbide tip, shanks and brazing material. Hydrogen is admitted through the rear of each muffle and is controlled by valves.

Furnace, Box-Type, Gas-Fired

Philadelphia Drying Machinery Co., 3351 Stokley St., Philadelphia, Pa. (Vol.80,p.827.)

This is an improved box-type heat-treating furnace for temperatures of 575 to 2,950 F. "Program Control" allows for controlled temperature increases or decreases at definite rates of

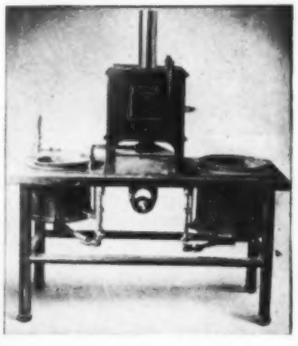


time. Five groups of tunnel burners are used to distribute the temperature uniformly. The air-gas ratio is controlled by a proportional mixing system. Lining of the furnace consists of Sillimanite brick and K-30 insulating brick.

Heat-Treating Table, Multi-Unit

Charles A. Hones, Inc., Baldwin, L. I., N. Y. (Vol.80, p.827.)

Four appliances are combined in the No. 640 multi-unit heat-treating table. These are: a No. 160A soft-metal furnace for



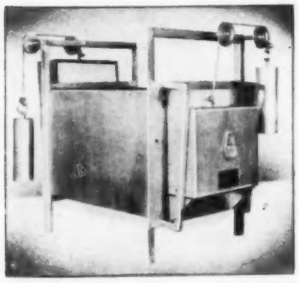
low-temperature salt work up to 700 F., a No. 54 oven furnace for heating steel up to 1,800 F., a No. 170 high-temperature

melting furnace for cyanide and high-temperature salts and a No. 14 laboratory burner for open flame heating. A three-point pyrometer gives a temperature reading on any furnace. Width, 24 in.; length, 36 in.; height, 31 in.; weight, 600 lb.

Furnace, Brazing, Electric

Harold E. Trent Co., 618 N. 54th St., Philadelphia, Pa. (Vol.80,p.532.)

This type "ML" furnace was made for special brazing work and was supplied with a door at each end so that operators can work at each end of the



furnace. The inside dimensions are 7½ in. wide x 5½ in. high x 14 in. deep, and the connected load is 5kw., 220 volts. Temperature is maintained with pyrometer control.

Furnace, Tool-Tempering

Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia, Pa. (Vol.80,p.829.)

Tools and dies can be placed in a small "Homo" tool-tempering furnace and left there to temper under completely automatic control. Because the

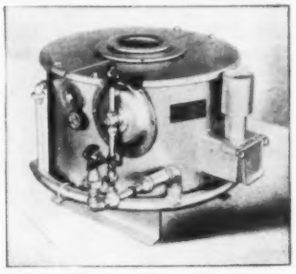
"Homo" furnace has a small heat capacity, it cools down immediately after the tool is removed; another tool can be put in cold and the temperature quickly run up to any point.

The tool-type Homo furnace stands only 45 in. high and can be loaded or unloaded without a hoist. Work space, 12½ x 15 in. Complete equipment consists of the furnace, control panel, instrument panel and recording controller.

Furnaces, Pot, Hardening

American Gas Furnace Co., Elizabeth, N. J. (Vol.80,p.826.)

These improved pot type hardening furnaces are supplied for operation at temperatures from 1,400 to 1,600 F. They are made in nine sizes, with pot diameters from 6 to 20 in. and depths from 10 to 20 in. They are designed for use with lead,



cyanide, neutral salts or carburizing salts as the heating medium. Improvements include insulating refractory lining backed by block insulation, heat-resisting alloy burners.

Furnace, Pot, "Screw-Type"

Lindberg Engineering Co., 221 Union Park Court, Chicago, Ill. (Vol.80,p.529.)

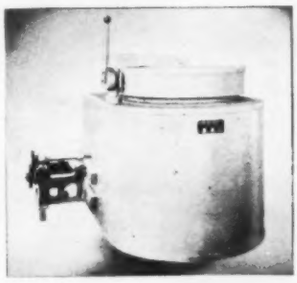
The combustion chamber of this pot furnace is built in the form of an internal helical path, which forms a continuous channel for the flame around the pot.

This burning arrangement, with tangential firing, minimizes the effect of flame impingement on the pot and walls. The furnace is furnished in six sizes, with pots from 12 x 18 in. to 24 x 24 in., and over-all dimensions from 40 in. diameter x 34 in. high to the largest size of 48 in. across, and 40 in. high.

Furnace, Drawing and Tempering

Despatch Oven Co., 622 Ninth St., S.E., Minneapolis, Minn. (Vol.80,p.1021.)

This convected-air, gas-fired furnace is for drawing and tempering dense loads. Such parts as bolts, rivets, washers, nuts,

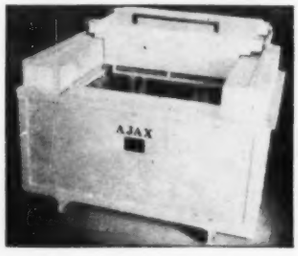


small gears, cutters, springs, small tools and dies are economically handled in steel baskets. These furnaces are available for two temperature ranges, 800 F. or 1,200 F. maximum. Low working height, top loading and minimum floor space requirements are featured.

Salt Bath, Electric

Ajax Electric Co., Frankford Ave., and Allen St., Philadelphia, Pa. (Vol.80,p.828.)

An unusual electrically heated salt bath for cyaniding, hardening, annealing and tempering is provided in this Ajax-Hultgren furnace. It has a pair of metal electrodes that are immersed directly in the salt. An alternating current passes through the salt and heats it by direct resistance, but does not

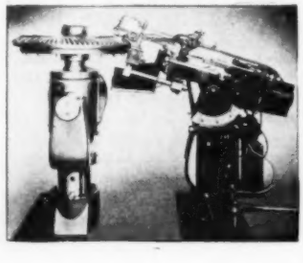


cause electrolysis such as would occur with direct-current. The pair of electrodes are arranged in close proximity on the same side of the bath so that the working space is kept distinct from the heating zone. Electromagnetic forces set up in a bath cause an automatic stirring action.

Surface Hardening Machine, Large Bevel Gear

Gleason Works, 1000 University Ave., Rochester, N. Y. (Vol.80,p.214.)

This universal machine surface hardens large bevel gear teeth with an oxyacetylene



flame. Pitches from 5 P.D. and diameters up to 100, inclusive, can be taken by the machine. No measurable distortion has been found in gears hardened by this process. The machine hardens both sides of a tooth simultaneously, precluding the danger of drawing or checking opposite sides. Two small water streams, directly back of the burners, quench the gears.

Furnace, Melting, High-Temperature

Charles A. Hones, Inc., Baldwin, L. I., N. Y. (Vol.80,p.827.)

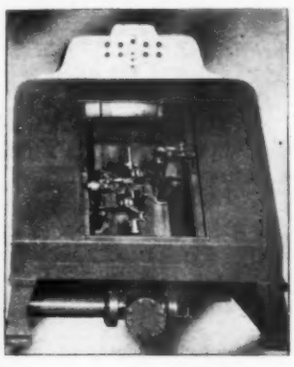
Quick, intense heat without the use of blowers or boosters is secured in the No. 171 high-temperature melting furnace. It is designed particularly for

melting such metals as aluminum and zinc. Its height is 37 in.; width, 24 in.; weight complete, 350 lb. Pot diameter is 12 in., depth is 18 in. Gas consumption is 300 cu. ft. per hr.

Hardening Equipment and Process, "Tocco" Induction

Ohio Crankshaft Co., Cleveland, Ohio. (Vol.80,p.935.)

Selective surface - hardening by electrical induction heating and instantaneous pressure quenching of practically all ferrous materials of cylindrical



section is now practical due to the development of the "Tocco Process" for hardening shaft bearing surfaces. This process produces a surface hardened zone that blends gradually into the core with no sharp line of demarcation and consequently no opportunity for spalling.

Accurate current and time controls permit the production of a desired treatment in a very short time. When the correct temperature is attained, the electrical circuit is opened and simultaneously the heated surface is quenched by a spray from a water jacket built into the inductor block.

Annealing Box, "Calite BL-28"

The Calorizing Co., Wilkinsburg Station, Pittsburgh, Pa. (Vol.80,p.1092.)

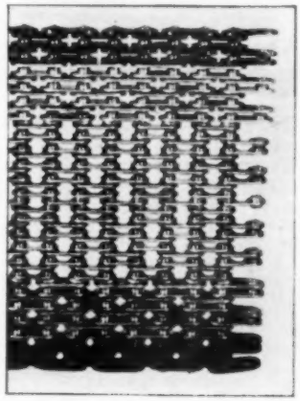
These annealing boxes or trays are designed for carrying forgings and castings through a roller-rail type annealing furnace. The sides, ends and bot-

toms are separate castings of Calite BL-28 alloy, interlocked with angle-section pins inserted in stake-like pockets in the corners. This sectional construction allows for expansion under uneven temperature conditions when in use.

Belt Conveyor, Furnace Metallic

Whitney Chain & Mfg. Co., Hartford, Conn. (Vol.80,p. 636.)

Open-mesh conveyor chains for conveying parts to furnaces and ovens offer a maximum of smooth flat conveying surfaces. Each chain is made from standard units to the desired width. The open-mesh construction allows free circulation of air when required.



Blowers, Furnace

Ingersoll-Rand Co., 11 Broadway, New York, N. Y. (Vol. 80,p.840.)

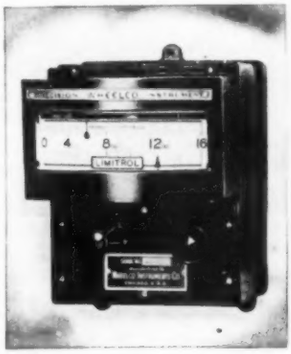
Especially designed for use with oil- and gas-burning furnaces, the single-stage Type "C" Motorblowers feature a flat-pressure characteristic over a wide range of volume demand.

This permits efficient burner operation regardless of a constant variation in the number of burners in use. All units are built for 1-lb. discharge pressure with volumes ranging from 350 to 3,200 cu. ft. per min.

Furnace Control, "Limitrol"

Wheelco Instrument Co., 1112–14 Milwaukee Ave., Chicago, Ill. (Vol.80,p.831.)

The function of the "Limitrol" is to disconnect a furnace or ring an alarm should the temperature within the furnace rise to a predetermined danger level.



This instrument employs a no-contact radio circuit with one vacuum tube. Current change in the tube operates a relay control.

Furnace Control, "Flame-otrol"

Wheelco Instrument Co., 1112–14 Milwaukee Ave., Chicago, Ill. (Vol.80,p.831.)

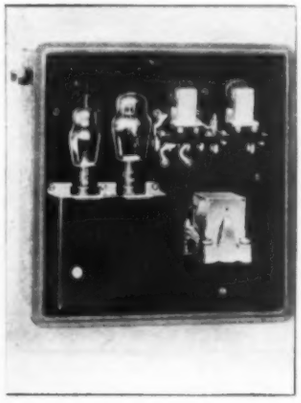
Based on a simple application of a radio circuit using one vacuum tube, the "Flame-otrol" is a safety device for turning off main-line fuel supply before gas can accumulate from failure of

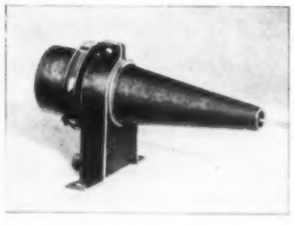
pilot or burner flame. There is no time lag in which gas or fuel might escape and cause damage from explosion. The flame is used as a switch. Failure of the flame instantly opens a control circuit, which closes the main line valve.

Combustion Control, Gas-Fired Furnace

Brown Instrument Co., Philadelphia, Pa. (Vol.80,p.529.)

"Protectoglo" equipment includes two types of relays and a flame sensitive electrode which can be used as a special spark plug for electric ignition. Standard primary controllers





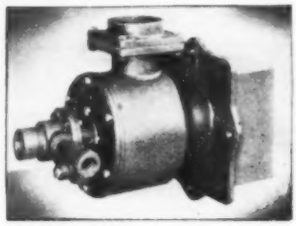
and motor valves are used to complete the system. Among industrial applications of the equipment are gas-fired furnaces for heat-treatment of steel and its alloys. Any interruption in the circuit to ground through the flame, such as flame failure, causes instantaneous shut-down.

The cast-iron cases are dust- and moisture-proof and can be arranged for either flush- or front-mounting.

Gas Burner, Luminous

North American Mfg. Co., 2910 E. 75th St., Cleveland, Ohio. (Vol.80,p.840.)

This luminous-flame gas burner is made in sizes to burn from 400 to 3,000 cu. ft. of natural gas per hour. Flames have a high degree of lumin-

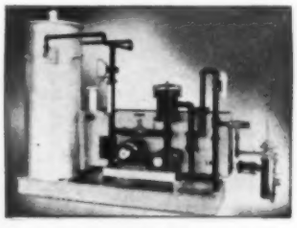


osity and are unaffected by turbulence. Burners are easily installed in furnaces of various sizes and design. They are controlled by the "Air-Way" proportioning valve.

Gas Generator, Controlled Atmosphere

Electric Furnace Co., Salem, Ohio. (Vol.80,p.828.)

Protective atmospheres required in controlled-atmosphere furnaces for bright annealing, scale-free heat-treating, copper brazing and clean and bright hardening can be obtained from the Elfurno generator. The

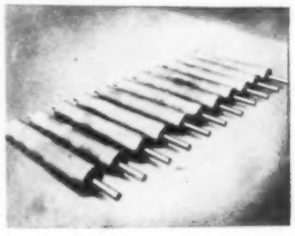


equipment consists of a combustion chamber, a motor-operated compressor, a flow meter and a cooling unit. These generators are available in several standard sizes to produce from 100 cu. ft. of gas per hr. and up.

Rollers, Conveyor

Michigan Steel Casting Co., St. Aubin Ave., Detroit, Mich. (Vol.80,p.828.)

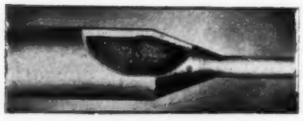
"Centricast" furnace conveyor rolls are available in sizes from 2 to 10 in. O.D., in wall thicknesses to suit service requirements and in finished lengths from 2 to 6 ft. End castings are flash welded to the centrifugally cast tube.



Rollers, Conveyor, Furnace, "Calite BL-28"

The Calorizing Co., Wilkinsburg Station, Pittsburgh, Pa. (Vol.80,p.1096.)

The Calite BL-28 alloy furnace rollers feature a centrifugally cast body that is flash-welded to sand-cast neck and shaft ends. The quality of the

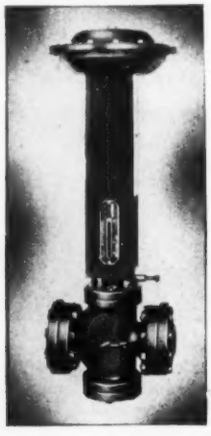


weld is illustrated in the cutaway roll-section shown. These rollers may be stressed to 2,000 lb. per sq. in., at 1,800 F.

Valves, Furnace Control Moto

Taylor Instrument Co., Rochester, N. Y. (Vol.80,p.639.)

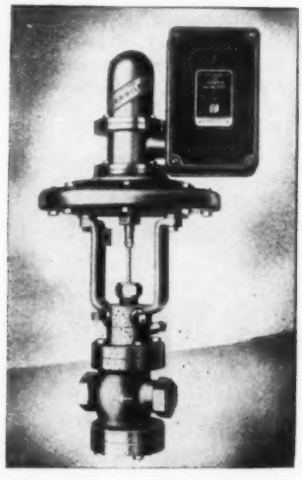
All-steel welded construction is used for the "Motorsteel" diaphragm-valve motors. With this construction the valves are light in weight, strong, and have high resistance to shock. A large molded diaphragm in the valve motor has formed impressions in the top plate to provide free access of air pressure in starting, thus insuring effective initial force. The stem guide has a free-rolling action throughout the stroke.



Throttling-Valve Accessory, "Vernier Valvactor"

Foxboro Co., Foxboro, Mass. (Vol.80,p.70.)

The Vernier Valvactor eliminates valve sticking and assures hairline valve positioning. This device enables throttling-type air-operated control instruments to make small gradual adjustments of the control valve position regardless of friction or hysteresis. Air from the control instrument need change as little as ½ in. of water to cause a corrective positioning of the valve and to force the stem to take a position within 0.001 in. of the previous one. The Vernier Valvactor can be attached directly to the spring housing all sizes of "Stabilflo" valves.



Lathes

Lathe, Bench, "Workshop"

South Bend Lathe Works, South Bend, Ind. (Vol.80,p. 215.)

The 1936 model, 9-in. "Workshop" precision bench lathe now has a four-step cone headstock, with a single V-belt drive from the countershaft as an optional drive arrangement. The eight spindle speeds range from 44 to 585 r.p.m. Bed lengths of 3, 3½, 4 and 4½ ft. are available.

Lathe, Pedestal-Type Drive

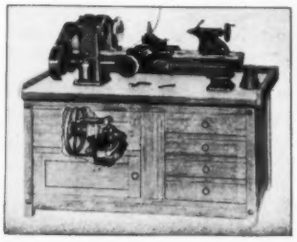
South Bend Lathe Works, South Bend, Ind. (Vol.80,p.783.)

A pedestal-type motor drive is available for the 1936 Model 9-in. "Workshop" lathe. The mechanism is a separate unit mounted on a pedestal back of the lathe with horizontal counter-shaft and motor in line with the headstock cone pulley. An adjustable tension device between the countershaft and the headstock regulates the tension of both the flat belt between the cone pulleys and the V-belt from motor to drive pulley.

Lathe, Bench, Under-Bench Drive

South Bend Lathe Works, South Bend, Ind. (Vol.80,p.318.)

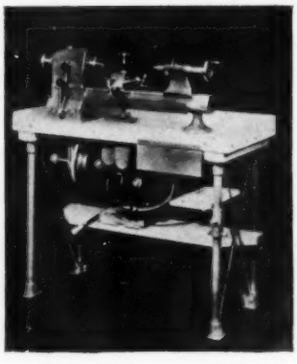
The 1936 model, 9-in. "Workshop" bench lathe may be had with an underneath belt motor drive. The lathe is mounted on either a frame or cabinet bench, and the motor and drive unit are supported on a pivoting frame underneath the bench top. The belt-tension-release crankhandle controls the position of the frame and countershaft. This lathe can be fitted with either a flat- or a V-belt drive.



Lathe, Bench, "Cataract"

Hardinge Bros., Inc., Elmira, N. Y. (Vol.80,p.391.)

The "Cataract" precision bench lathe has an improved headstock fitted with preloaded ball bearings. It comes in five sizes, ranging from ½ to 1 in. collet capacity and 7 to 9 in. swing. All models have a 36-in. bed. Motor drive mechanism is located under the bench and drive to the spindle is through V-belts. A mechanical brake is mounted inside the headstock and is operated by the forward-stop-reverse control lever.



Lathe, Bench, Precision

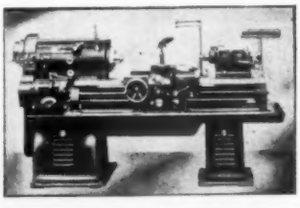
Pratt & Whitney Div., Niles-Bement-Pond Co., Hartford, Conn. (Vol.80,p.711.)

Intended for toolroom work of a fine precision nature, this 10x20-in. bench lathe has a bed length of 44 in. with a 10-in. swing over the bed, a 6½-in. swing over the cross slide, and a maximum center distance of 20 in. The hole through the spindle is 1 5/16 in., providing a 1-in. collet capacity. Spindle is mounted in sealed super-precision ball bearings. Drive is by a Transitorq DT-¼ equipped with a ½-hp., 1,800 r.p.m. motor. This equipment produces spindle speeds ranging from 200 to 2,000 r.p.m. Power is transmitted to the headstock spindle through four V-belts. Net weight, 350 lb.

Lathe, Toolroom

R. K. LeBlond Machine Tool Co., Cincinnati, Ohio. (Vol.80,p.934.)

The spindle is supported at short intervals in three large anti-friction bearings. The apron has one control for both longitudinal and cross movements. Automatic length stops operate in both directions.

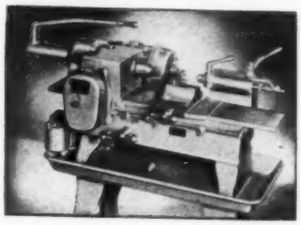


There are 56 quick changes of feed from 0.0013 to 0.166 in. per rev.; there are also 56 changes of thread from 1½ to 184 threads per inch. Leadscrew and feed rods have separate drives. Front and center spindle bearings are of the preloaded precision tapered roller type, while the end bearing is a floating roller bearing to compensate for variations in spindle length due to temperature changes.

Lathe, Manufacturing, High-Speed

Porter-Cable Machine Co., Syracuse, N. Y. (Vol.80,p.936.)

A high-speed headstock, available for the 9-in. swing manufacturing lathe, provides speed for the rapid turning, facing and boring of small precision parts such as valves, pis-

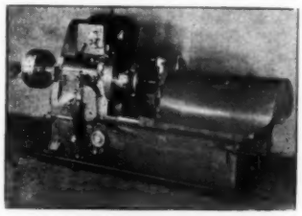


tons, pulleys and commutators. It is particularly adapted to second-operation work with tungsten-carbide, stellite or diamond-tipped tools. The machine is adaptable to either chucking or between-centers work up to 20 in. long. Spindle speeds up to 3,600 r.p.m. may be obtained. Feeds of 0.0005 to 0.010 in. per revolution are provided by pick-off gears.

Lathe, Automatic, "Simplimatic"

Gisholt Machine Co., Madison, Wis. (Vol.80,p.280.)

Two radial-slide "Simplimatic" lathes have been set up to machine completely automobile flywheels in two operations. Production has been increased to 44 flywheels per hour. A special tool carriage, with a vertical face on which the tool



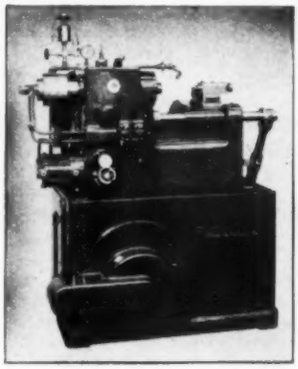
slides are mounted radially to the work, supplants the conventional flat-table principle which uses only one plane for cutting. This carriage brings the tool slides up close to the work.

The machining cycle is entirely automatic. Tungsten carbide and Stellite-J metal tools are used in the roughing operations, removing approximate $\frac{3}{32}$ in. stock. The cutting speed is approximately 200 ft. per min., which is dropped down to 100 ft. per min. for the final shaving operation. Feed is about 0.030 in. per revolution.

Lathe, Automatic, Chucking

R. K. LeBlond Machine Tool Co., Cincinnati, Ohio. (Vol. 80,p.354.)

Specially arranged for turning a grease-retainer groove in the bore of a ball-bearing race, this 11-in. automatic chucking lathe has a "Transitorq" drive, an air-operated tool carrier and

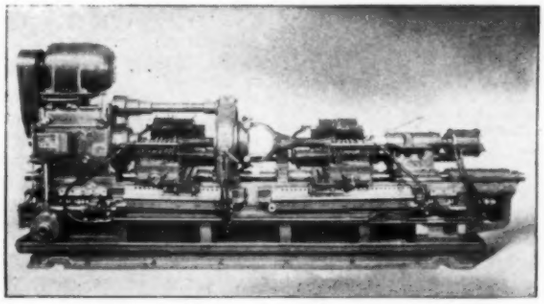


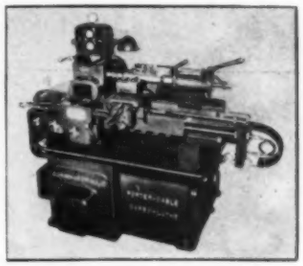
a cam-operated feed. Speed variations are infinite from 100 to 600 r.p.m. Cross feed rates range from 0.0015 to 0.010 in. per rev. The work is held in an air-operated collet controlled by a small lever at the operator's left.

Lathe, Automatic, Center Drive Head

Jones & Lamson Machine Co., Springfield, Vt. (Vol.80, p.975.)

This center-drive attachment for the 20-in. Fay automatic lathe makes possible the simultaneous turning of both ends of long, heavy shafts and similar pieces. One of these attachments is shown set up for the first-operation turning, facing and forming both ends of a truck rear-axle housing. The housing is driven by a fixture, mounted in the center-drive attachment, which engages the banjo portion of the housing in a clamping arrangement.





Lathe, Automatic, With Electric Head

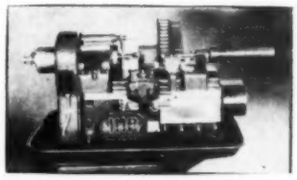
Porter-Cable Machine Co., Syracuse, N. Y. (Vol.80,p.70.)

This electric head forms a central control for the entire electrical and pressure systems. It can be installed on either the hydraulic or mechanical "Carbo-Lathe." Starting and stopping buttons are provided for all electric motors, pressure gages give a continuous check of air or hydraulic pressures and direct-reading ammeters show the power being consumed.

Lathe, Automatic, With Safety Handling Devices

Seneca Falls Machine Co., Seneca Falls, N. Y. (Vol.80, p.672.)

By equipping the "Lo-Swing Imp" automatic lathes with automatic work-handling devices, accident hazards have been reduced and production increased. The set-up shown is used on a bronze-bushing job. The work chute is kept filled by the op-

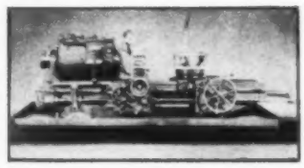


erator and the work is fed automatically to the work-holding arbor for machining. After the machining operation is completed, the tool withdraws and returns automatically to the starting point while simultaneously the finished work is stripped from the mandrel.

Lathe, Turret, Universal, No. 4-A

Warner & Swasey Co., Cleveland, Ohio. (Vol.80,p.66.)

The No. 4-A universal turret lathe is offered in 8- and 9-in. spindle capacities with 28¼-in. swing. Cross-slide and square turret have a square lock gib. Hard-steel replaceable wear strips have been added to the seat of the cross-slide to preserve initial accuracy. The square turret has an internal circumferential clamp ring that overcomes the



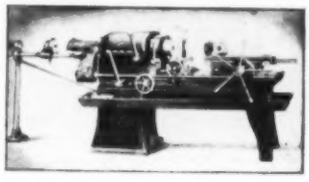
tendency for looseness due to excessive wear.

A direct-reading indicator in the head gear shift enables the operator to select the desired spindle speed. Rapid traverse for the cross-slide is offered as optional equipment. An independent leadscrew is provided for threading operations. Pick-off gears drive this leadscrew.

Lathe, Turret, No. 4-H

Millholland Sales & Machine Co., 1115 E. 35th St., Indianapolis, Ind. (Vol.80,p.1092.)

The No. 4H turret lathe is designed for securing maximum production from all classes of materials with the latest developments in cutting tools. The headstock has twelve speeds forward and reverse, ranging from 39 to 1,000 r.p.m.



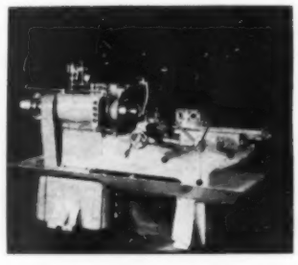
These machines will swing 16½ in. over the ways and 7¼ in. over the cross slide. The twelve feeds range from 0.0005 to 0.136 in. Automatic chuck capacity is 1⅛ in. round stock, 1⅛ in. hexagon stock, 1¼ in. square stock. A length of 9½ in. can be turned.

Lathe, Turret, High-Speed

Gisholt Machine Co., Madison, Wis. (Vol.80,p.212.)

Gears and clutches have been omitted from the spindle and headstock of this turret lathe. The spindle is mounted in tapered roller bearings and is driven by V-belts directly from the motor. Speed variations are made by using different diameter sheaves and motor pulleys.

Control of the spindle is by means of a pushbutton panel on the headstock, providing

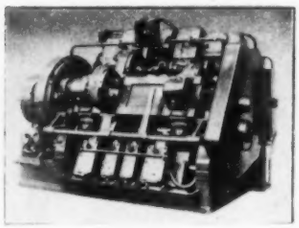


start, stop, reverse and the various speeds of the motor. The automatic collet chucking capacity for round, hexagon and square stock is 1½ in., 1⅜ in., and ½ in., respectively. An 8-, 10- or 12-in. scroll chuck can be used. The machine has a maximum of 18½ in. swing over the steel-topped ways. Work-holding equipment of any desired type may be readily attached.

Lathe, Crankshaft, Automatic

R. K. LeBlond Machine Tool Co., Cincinnati, Ohio. (Vol.80,p.524.)

This high-production crankshaft finish-turning lathe eliminates a straightening and a rough-grinding operation. It is used for all line, stub and flange end bearings and for facing all the related portions thereto. Four stations on a revolving drum advance the crankshaft progressively from the loading and unloading station through



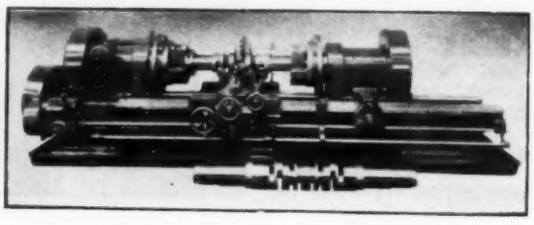
the three machining operations, each removing a relatively small amount of stock, thus setting up a minimum of strain on the cutting tools. Production, 45 to 55 shafts per hour.

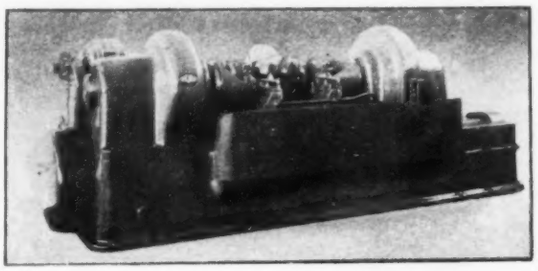
Lathe, Crankshaft, Universal, 30-In.

R. K. LeBlond Machine Tool Co., Cincinnati, Ohio. (Vol.80,p.562.)

The heavy-duty 30-in. universal crankshaft lathe is adjustable for any throw up to 3½ in. or 7 in. engine stroke. It can be indexed to any division for two, three, four, six or twelve positions. A change of tooling adapts the lathe to any crank within its range.

Counterweights on both the head and tailstock spindles compensate for off-balance weights of fixture and crank. Head and tailstock fixtures are driven together, eliminating possibility of springing the crank.





Lathe, Crankshaft, Heavy-Duty

Wickes Bros., Saginaw, Mich. (Vol.80,p.355.)

The work cycle of this Model DA-8 lathe is entirely automatic and provides rapid traverse of tools to cutting position; coarse cheeking feed; fine turning feed; dwell, to clean up the cut; diameter stop; rapid traverse of tools to unloading position and stop in unloading position. The lathe is shown set up for cheeking, turning and filleting Nos. 1 and 4 crankpins on a heavy diesel crank. Net weight of the machine, with electrical equipment is 28,000 lb.

Chucking Machines, Work-Rotating

New Britain-Gridley Machine Co., New Britain, Conn. (Vol.80,p.707.)

Features of identical design are used wherever possible in the No. 49 and No. 675 work-rotating chucking machines. They differ principally in the number of spindles and the work capacity. The No. 49 model has four 9-in. chucks with a 9¾-in. swing, and the No. 675 model has six 7½-in. chucks with a 7¾-in. swing.

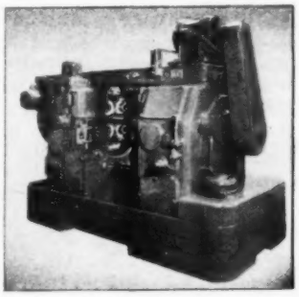
Each of the inclosed mechanisms is in a separate compartment, each with a sliding door. This construction simplifies the machine and aids servicing and set-up. Spindles run in anti-friction bearings and are fitted with positive-jaw, syncro-mesh clutches. The spindle in the loading position can be started and stopped at will. Change gears in the power case provide speeds from 37 to 764 r.p.m. Chucks are hydraulically operated. The motor drives through a silent chain, and is of 10 to 20 hp. according to requirements. Floor space required by either model is 106x53 in.

Chucking Machines, Automatic, Model RP

National Acme Co., Cleveland, Ohio. (Vol.80,p.173.)

These machines are available in four- and six-spindle types. Capacity, 8-in. swing. Loading is done in the upper front position and the pan is arranged so that the operator can stand close to the machine.

A pushbutton station at the left permits control of the

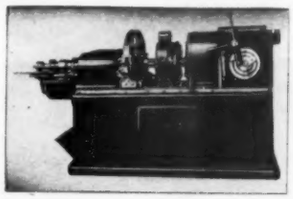


electric chuck. By using another pushbutton the spindle can be rotated independently of the main drive to check run-out. While the operator is chucking a piece, the tools are at work on the other spindles. At the end of a cycle the tools withdraw and the feed is then interrupted until the operator pulls a starting lever conveniently mounted at the operating position. The slides are mounted vertically so that chips and dust will not lodge on the guides.

Screw Machine, Automatic

Windsor Automatic Co., Inc., Windsor, Vt. (Vol.80,p.178.)

The "Di-Matic" Model A is a simple, completely automatic screw machine. It has two non-indexing spindles of the standard automatic type with draw-in collets of 1½-in. maximum capacity. Feed length is 6 in. End tools are placed in an indexing turret and the tools are brought to the work spindles alternately. The indexing arm is actuated by a cam which allows "dwell" enough to feed out the stock in turn. Indexing is done easily and quickly. Each spindle has its own form-



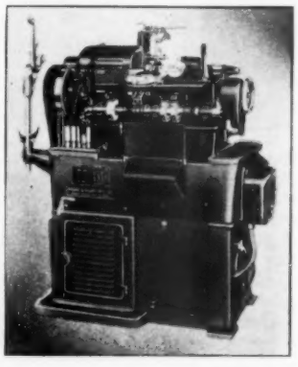
ing tool, finish forming tool and cutting off tool mounted in a rigid frame and carried by the cross-slide. As many as seven operations can be performed at once. Floor space required is 8x3 ft., without stock reel. Weight is approximately 4,500 lb.

Screw Machine, Automatic, No. 00G

Brown & Sharpe Mfg. Co., Providence, R. I. (Vol.80, p.279.)

Major changes in design have been effected in the No. 00G high-speed, motor-driven automatic screw machine to increase its productive capacity. It is now possible to obtain correct speeds for any job up to ⅜ in. diameter, or ½ in. diameter on light work, on either hard steel, free-cutting steel, brass or any of the free-cutting materials.

Thirty-six changes in spindle speed are available, the range extending from 200 to 6,000 r.p.m. Speed and feed changes can be made easily and quickly.

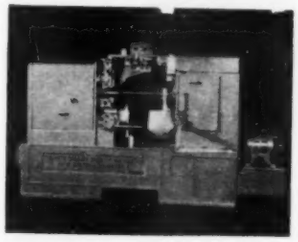


The regular feed tube furnished with the machine accommodates a No. 10 feeding finger which is stocked in sizes up to and including ⅜ in. round. When the ½ in. capacity feed tube is used on material larger in diameter than ⅜ in. round, a No. 10A feeding finger is available in several sizes. To permit the use of No. 00 spring collets and feeding fingers, an extra nut, sleeve and adapter are furnished as part of the regular equipment.

Screw Machines, Automatic

New Britain-Gridley Machine Co., New Britain, Conn. (Vol. 80,p.594.)

Model 61 and Model 42 automatic screw machines are built on the same frame and make available for larger sizes of bar stock the same features that have proved successful in the smaller models. Model 61 consists of three six-spindle sizes, 1⅛, 2 and 2¼ in., while



Model 42 consists of 2⅝ and 3 in. bar capacity four-spindle sizes. The difference in the two models is in the spindle carrier and the main tool slide.

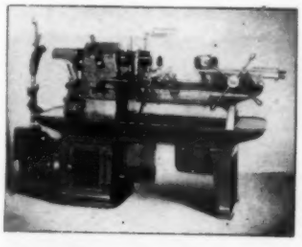
Freedom from wear of the spindle carrier is assured by lifting it from its seat during indexing and automatically clamping it securely during the cut. The carrier is fitted with ball-bearing spindle mountings and has hardened and ground locking-bolt slots. Spindles are short to eliminate deflection. Main tool slide cam is entirely inclosed to protect it from chips and dirt, yet it is readily reached for changing. Cams are jig-drilled to insure interchangeability and rapid changeover.

Screw Machine, Wire-Feed, No. 2

Brown & Sharpe Mfg. Co., Providence, R. I. (Vol.80,p. 779.)

This machine is economically set up for small-run jobs, or for parts subject to frequent changes in design where special tooling is not warranted.

A 5 to 1 ratio between fast and slow speeds enables a slow speed for threading and high speed for other operations. Full



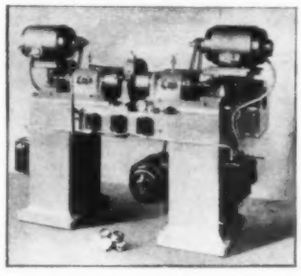
advantage can be taken of the free-cutting materials, such as brass, aluminum and high sulphur steels. Time-saving features of automatic stock feed, fast turret indexing and convenient means for reversing the spindle assure high rates of production. Adjustable stops on cross slides and turret slides permit very close tolerances to be maintained.

While primarily intended for bar work, these machines can be efficiently adapted to secondary operations on work that can not be completed on the bar. Standard chucks or special fixtures can be mounted on the threaded spindle nose. Capacity of machine; 1 in. in diameter by a turning length of 4 in.

Facing Machine, Special Gate-Valve Body and Wedge

Automatic Machine Co., Bridgeport, Conn. (Vol.80,p. 782.)

This is an automatic machine for facing seats on standard brass gate valves and wedges up to 2 in. diameters. Both seats are finished simultaneously with

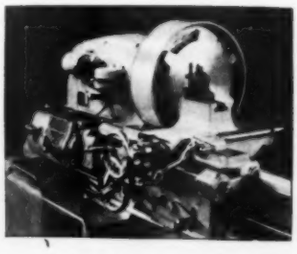


a roughing and a finishing cut. All automatic movements are controlled by camming and the cycle of the machine is from 6 sec. on the smaller sizes to 12 sec. on the larger sizes of valves. By changing the work-holding fixtures both body and wedge can be finished on the same machine.

Drive, Lathe, Hydraulic

Monarch Machine Tool Co., Sidney, Ohio. (Vol.80,p.635.)

A hydraulic multi-speed drive is available for all lathes where it should be used. These drives are furnished in 5-, 10-, 15- and 20-hp. sizes, and provide



any desirable range of spindle speeds. Both toolroom and production lathes can be fitted with the drive.

The hydraulic variable-speed transmission is housed in a specially constructed headstock. Drive from the transmission is by multiple V-belt to an anti-friction sheave, multiple splined to the spindle. Where a slower range of spindle speeds is desired, a helical back-geared unit is installed in the headstock.

Lathe Operation Index

Lehmann Machine Co., St. Louis, Mo. (Vol.80,p.747.)

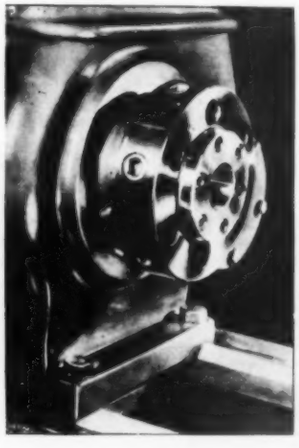
The addition of an operation index to the headstock of the Hydratrol lathes permits the use of predetermined spindle speeds for each operation.

These lathes have sixteen speed changes, automatically effected through hydraulic medium by the operation of a three-lever handle on the headstock. Once the index panel has been marked with the operation number, the operator can set this index to the central indicator and the speed is automatically changed to the predetermined value.

Spindle Nose, Cam-Lock Flange

Monarch Machine Tool Co., Sidney, Ohio. (Vol.80,p.527.)

Offered as optional regular equipment on all sizes of engine lathes and toolroom lathes from 12 to 18 in. size, inclusive, this cam-lock flanged spindle permits quick clamping or removing of chucks, plates and



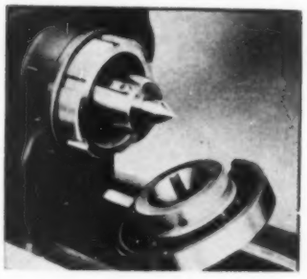
fixtures to the spindle nose. The design prevents these parts from working loose even under severe conditions.

The flange nose is 7½-in. diameter and the entire spindle is hardened to about 60 Rockwell C. All cams, studs, locks and screws are hardened. The locating surface on the flange spindle, the tapered cenralizing section and the taper bore are accurately ground.

Spindle Nose, Tapered and Keyed

R. K. LeBlond Machine Tool Co., Cincinnati, Ohio. (Vol.80, p.636.)

The adoption of the new tapered and keyed spindle nose permits rapid, accurate and positive placement of lathe chucks, faceplates and fixtures. The key in the spindle permits plates or chucks to be hung on the spindle, allowing the op-



erator to use both hands to start and to tighten the collar. Loose fit of the thread in the collar and on the chuck or faceplate allows quick attachment and holds securely without binding. Only three sizes of chuck and faceplates are required with this new taper nose for all sizes of Le Blond lathes from 12 to 36 in.

Spindle Nose, Tapered and Keyed

Reed-Prentice Corp., Worcester, Mass. (Vol.80,p.746.)

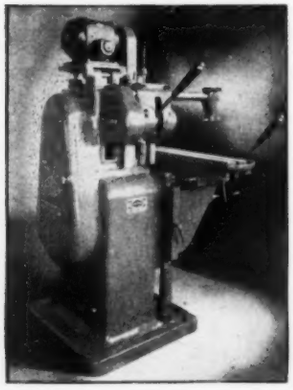
This tapered and keyed spindle nose is standard for the 14- and 16-in. Model AA sliding gear head engine and the Model B toolroom lathes. Construction includes a long, hardened taper bearing for alignment and a safety key for holding. The key permits plates or chucks to be hung on the spindle, thus allowing the operator to use both hands to start and tighten the collar.

Milling Machines

Milling Machine, Hand

Producto Machine Co., Bridgeport, Conn. (Vol.80,p.899.)

The No. 2 precision-type heavy-duty hand milling machine has a range of spindle speeds from 106 to 1,050 r.p.m. The one-piece column supports the slides for the knee and cutter head. Drive from the motor to the cutter spindle is obtained through V-belts and pulleys that give six changes of spindle speeds.

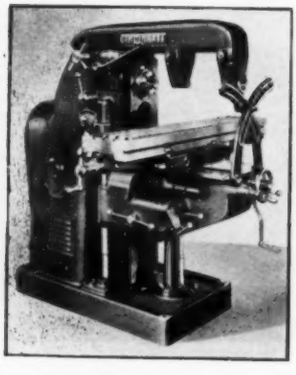


Specifications: Area of base, 30x28 in.; height from floor to top of motor, 63 in., working surface of table, 26 x 6 in.; feed of table 8 in. by hand lever, 20 in. by crank lever; cross feed, 7 in.; vertical feed, 15 in.; net weight, 1,350 lb.

Milling Machine, Plain, No. 2-MH

Cincinnati Milling Machine & Cincinnati Grinders Inc., Cincinnati, Ohio. (Vol.80,p.778.)

The No. 2-MH milling machine is of the same general design as the L type, except that it is heavier throughout. It is suitable for small and medium-size work in toolroom- or job-lot quantities. This style is available in both plain and universal models.

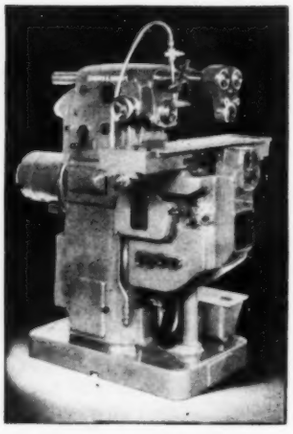


Fifteen spindle speeds, from 23 to 1,200 r.p.m., are available through two quick acting levers. Twelve longitudinal feeds are available, ranging from ¾ to 30 in. per min. Power feeds for the cross and vertical travels are included in the design. All feeds are reversible from the front and rear, and power rapid traverse is provided in six directions. These machines have 28-in. longitudinal table travel, 10-in. cross travel and 19-in. vertical travel for the plain model.

Milling Machine, Plain, No. 10

Brown & Sharpe Mfg. Co., Providence, R.I. (Vol.80,p.895.)

Full electrical control of all table and spindle movements is provided in the No. 10 knee-type plain milling machine. It is designed for the rapid manufacture of small parts on long or short runs. Sixteen spindle speeds, ranging from 55 to 1,800 r.p.m. and sixteen feed rates, ranging from ½ to 20½ in. per min. are available. The table motor provides a rapid-traverse movement of 300 in. per min. in either direction.

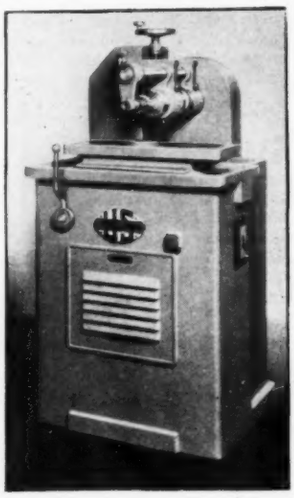


The machine has a 12 in. table feed, 2 in. traverse adjustment of the spindle, and 11½ in. vertical knee adjustment. Hand adjustments in all three directions, together with all other principal adjustments and operating controls, are within easy reach from the front of the machine. A wide variety of automatic milling cycles is available.

Milling Machine, Manufacturing

U. S. Tool Co. Ampere, N.J. (Vol.80,p.251.)

The "Multi-Miller" is adapted for high-speed, semi-automatic production of large runs as well as for special hand-milling operations. Power table feed is actuated by a single disk cam which provides any desired table speed or combination of speeds. Table working surface is 6x20-in. and one ⅝-in. T-slot is provided in the center. The longitudinal feed is 4 in. A ⅓ hp. motor drives the table feed. Horizontal adjustment of the spindle is 2½ in. and the vertical adjustment is 3¾ in. The spindle drive requires a ¼-hp. motor. Drive is through V-belts giving speeds of 177, 286, 850, and 1,290 r.p.m.



Milling Machine, Omniversal

Brown & Sharpe Mfg. Co., Providence, R.I. (Vol.80,p. 1021.)

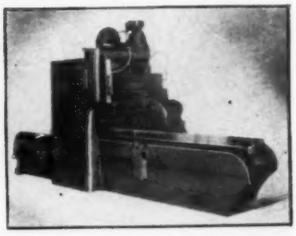
The No. 0 Omniversal milling machine has been equipped with an Omniversal milling head that increases the range of the machine. Another added feature is provision for synchronizing the knee-slide feed and headstock-spindle rotation for milling spirals.

The addition of the Omniversal head provides further means of obtaining accurate, simple and compound angular settings in any plane. The milling head spindle, in all positions, is gear-driven from the rear of the machine spindle. It has a speed range of 88 to 2,860 r.p.m., in approximately a 2 to 1 ratio with the machine spindle speeds.

Milling Machine, Manufacturing

Sundstrand Machine Tool Co. Rockford, Ill. (Vol.80,p.819.)

This hydraulic "Rigidmil" has an automatic operating cycle which includes hydraulic actuation of the spindle-head and clamping both ends of the cross rail as well as hydraulic feed and rapid traverse of 72 in. in both directions of the table. The machine shown is built for milling five intermittent keyways in eight heavy shafts simultaneously.



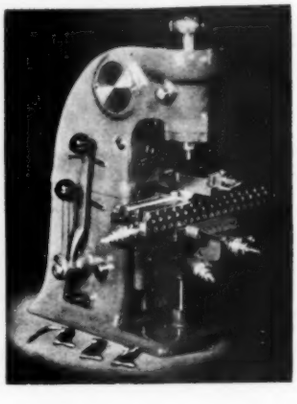
The operating cycle is entirely automatic after starting, and is accurately controlled by adjustable dogs. This makes the machine readily applicable to a wide variety of work. The control is equally effective in both directions and is suitable for "climb cut" milling.

Milling Machine, Vertical, Bench

Hardinge Bros., Inc., Elmira, N. Y. (Vol.80,p.836.)

Ball-bearing spindle construction for high spindle speeds is featured in this precision vertical milling machine for bench mounting. Index heads, tailstocks, swivel bases, universal adapters, right-angle bases, lever-feed arrangements and routing attachments are available in addition to the vise.

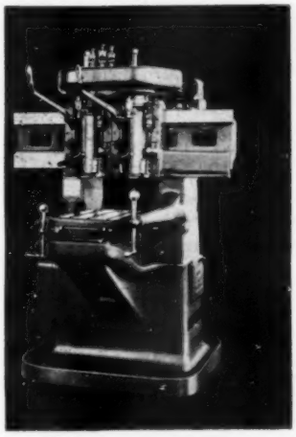
The electrical driving unit is mounted under the bench. Eight spindle speeds, up to 5,000 r.p.m., are available. Table working surface is 12 x 3¾ in. The micrometer-controlled travel of table: longitudinal, 5⅞ in.; transverse, 3⅜ in., and vertical, 5¾ in. Vertical head has a ½ in. collet capacity, and the index head ½ or ¾ in. collect capacity. Bench space, 23 x 22 in.



Milling Machine, Vertical, High-Speed

Pratt &Whitney Div., Niles-Bement-Pond Co., Hartford, Conn. (Vol.80,p.670.)

The No. 12B high-speed miller and profiler is available with either one or two spindles, and can be supplied either as single-purpose or a general-purpose machine. The design is similar to other P. & W. profilers in that the spindles travel longitudinally on a cross-slide while



the table travels transversely between the two columns.

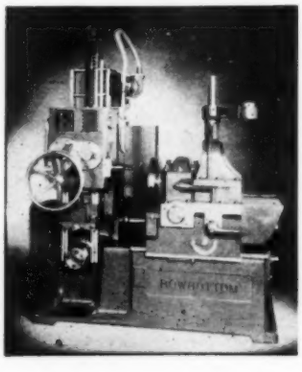
Each spindle has a vertical adjustment of 4½ in. and the minimum distance from the table top to the spindle nose is 3½ in. Cutters are held in the spindle nose by a drawbar operating from the top of the machine that also functions as a positive knockout. Positive, vertical, adjustable stops are provided, each having a dial graduated in thousandths.

The total working surface is 14 x 18 in. and the total travel is 20 in. There is an 8-in. clearance between the table top and the bottom of the cross-slide. The distance between uprights is 20 in.

Milling Machine, Cam

The Rowbottom Machine Co., Sheffield St., Waterville, Waterbury, Conn. (Vol.80,p.1089.)

The Rowbottom cam milling machine has been redesigned to increase its capacity without

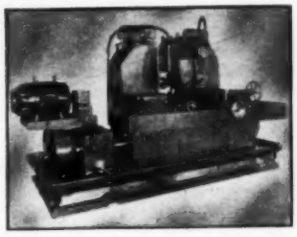


increasing the size of the machine. While the new machine is an improvement over previous models, formers from all previous models can be used. The capacity of the machine has been increased from 28 to 32-in. diameter for box and face cams and from 24 to 30-in. diameter for barrel cams having a travel, or throw, up to 12 in. Larger sizes can be handled with special fixtures. The machine occupies a floor space of 60 x 80 in., is 7 ft. high and weighs about 6,200 lb.

Milling Machine, Cam-Actuated, Special

Producto Machine Co., Bridgeport, Conn. (Vol.80,p.68.)

This No. 130 Producto-Matic machine was designed and built for milling locating spots or pads on crankshafts preparatory to center turning the bearings. The work is mounted between centers on the milling machine table. An equalizing device is used to support and align the work. To secure a

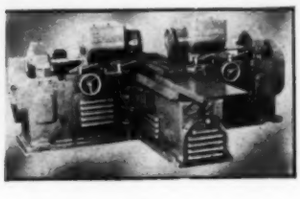


square bottom-cut on the finished surfaces a double-action movement is employed. This is secured by vertical movement of the spindles and a horizontal movement of the table. All movements are controlled and synchronized by cams. Production is 60 to 65 crankshafts per hour. The machine is built close to the floor to facilitate handling the heavy crankshafts. The table top is 34 in. above the floor and the base is 112 x 52 in.

Milling Machine, Horizontal

Defiance Machine Works, Defiance, Ohio. (Vol.80,p.254.)

This two-way opposed hydraulic-feed, face-milling machine simultaneously machines opposite sides of castings. The table has hydraulic feed, which provides an automatic cycle of fast advance, feed, and rapid return to stop. With additional dogs, the cycle can be arranged to provide a rapid advance, feed,



skip, feed and rapid return to stop.

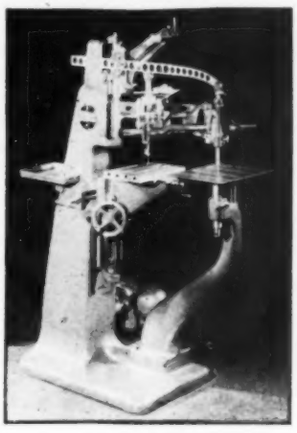
Work surface of the table is 18 x 36-in. and the length of travel is 48-in. Control can be adjusted to give from 1½- to 40-in. feed per min., and the fast travel is 240 in. per min. The heads are fully inclosed and have force-feed lubrication. Cutterhead spindles are mounted in precision bearings and have standard milling machine spindle noses. Each head is adjustable on the base.

Milling Machines, Die and Mold Duplicating

George Gorton Machine Co., 1103-13th St., Racine, Wis (Vol.80,p.350.)

Two sizes of three-dimensional pantograph machines for engraving and die and mold cutting are available. They are adapted for reproducing in reduced ratio direct from the models of any shape or contour. Reproduction ratios range from one-half to one-eighth size of model or master.

The cutter spindle and tracer



are always truly vertical with relation to the work. The high-speed spindles are mounted in precision ball bearings, and all pantograph joints and motor drive parts are ball bearing equipped. All feeds are by hand.

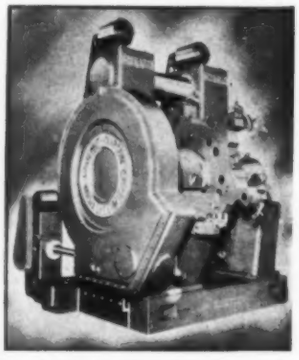
The No. 3-B machine will cut a maximum cavity of 6 x 12 in., and the No. 3-L will cut a 3 x 18-in. cavity, at one setting.

Milling Machine, Drum Type

Davis & Thompson Co., 6613 W. Mitchell St., Milwaukee, Wis. (Vol.80,p.278.)

This drum-type milling machine for cylinder blocks can be adjusted to take longer or shorter blocks as required. The finishing spindles have spherical bearings and are adjustable for toe cut to give the desired finish to the work.

The left-hand housing supports the cutters and is bolted solidly to the bed. The right-



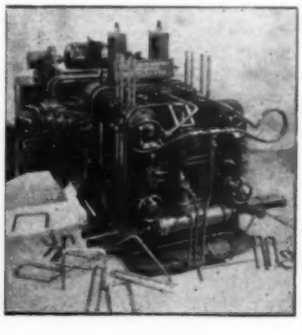
hand housing supports the work drum on a 22 in. diameter mandrel and is slideable on the base. The radius from the work-mandrel to the cutters is adjustable.

Miscellaneous Machines

Bending Machines, Tube

Williams, White & Co., Moline, Ill. (Vol.80,p.896.)

A number of high-production tube benders have been built for use in refrigerator manu-

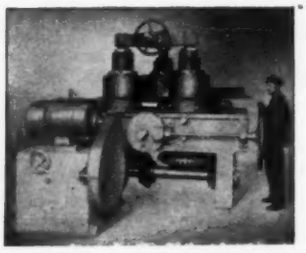


facture. The machine illustrated is a Type G16 hydraulic tube bender. This machine has capacity to bend sixteen 1-in. diameter, 16-gage steel tubes to a 4-in. radius or less. It is possible for an operator and a helper to fill, bend and unload one set of sixteen tubes in approximately 30 sec., making an approximate production of 1,920 bent pieces per hour.

Bending Rolls, Angle

Schatz Mfg. Co., Poughkeepsie, N. Y. (Vol.80,p.1096.)

"Schatz-Herkules" horizontal, angle-bending rolls are available in five sizes with capacity for rolling 3, 4, 5, 6 and 8-in. angles. Roll design assures accurate rolling without twisting.

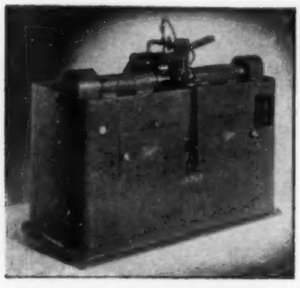


Operating speeds are 16 and 32 ft. per min. The unit illustrated is Size BO-34 and has a capacity to roll 8 x 8 x 1 in. angles and proportional sizes in other profiles.

Chamfering Machine, Double-End

Grant Mfg. & Machine Co., 90 Silliman Ave., Bridgeport, Conn. (Vol.80,p.973.)

The No. 283 double-end automatic chamfering, facing and burring machine will handle work up to 2½ in. diameter and



from 3/4 to 6 in. long. Parts are loaded in a magazine by the operator, after which all feed, clamping, machining and ejection operations are automatically performed.

Extractors, Oil, Centrifugal

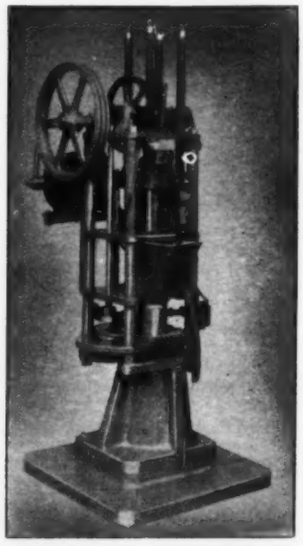
National Separator Co., Grafton St., Worcester, Mass. (Vol. 80,p.903.)

The National line of centrifugal oil extractors has been modernized. A top lid has been added and the units are fitted for direct-connected motor drive. A pan-cover lifting device has been included in the design of the top lid. Bearings are fitted with a force-feed oiling system. A safety lid lock is provided.

Briquetting Machine, Metal Chip

Grob Bros., Grafton, Wis. (Vol.80,p.564.)

This metal-chip briquetting machine exerts no pressure on any working part of the machine while the briquette is being formed. A drive dog on the drive shaft carries the crank

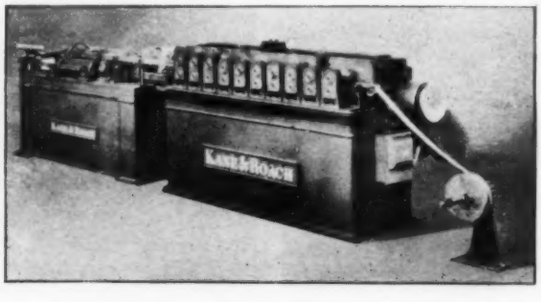


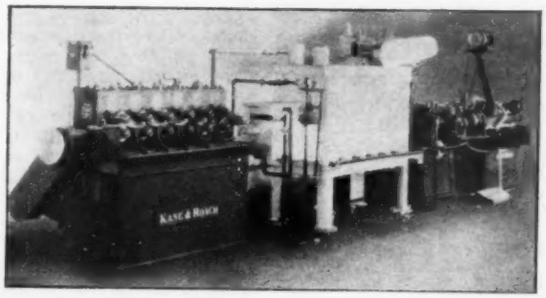
to its upper position. When the ram drops, this plunger enters a hardened steel bushing previously filled with metal chips. A number of bushings are located in a turn table. At the third station, a knockout plunger ejects the finished briquette.

Forming Machine, Radiator Tube

Kane & Roach, Inc., Syracuse, N. Y. (Vol.80,p.671.)

This tube forming set-up consists of a Series X cold-roll forming machine of the outboard housing type and a No. 3 flying saw. The forming machine produces ¼ in. high by 0.093 in. thick lockseam radiator tubing from copper ribbon stock 0.006 and 0.008 in. thick. The tube is formed at a rate of 300 ft. per min. It then passes through the tinning machine where it is given a 0.001 to 0.00125 in. solder coating. From there it passes into the flying saw. Here it is cut into 20 to 40 ft. or longer lengths.





Forming Machine, Radiator Tube

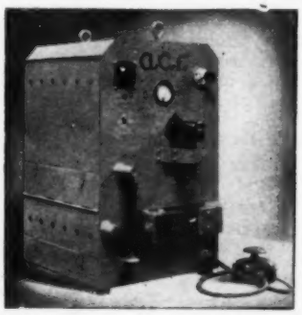
Kane & Roach, Inc., Syracuse, N. Y. (Vol.80,p.671.)

A complete set-up for cold forming and tinning radiator tubes is illustrated. The unit consists of a No. 00L 6-150 cold roll forming machine of the yoke type, a Series L tinning machine and a No. FD straightening machine with a rotary cut-off. Rectangular lockseam radiator tubes are formed from 0.0075 in. gage brass strip stock, the tube being 0.531 in. high and 0.093 in. thick. Another tube of the same outside dimensions can be made from 0.0095 in. gage material. Also, a round lockseam overflow tube 0.031 in. O.D. can be rolled from 0.015 in. brass strip stock. The unit operates at a production rate of 110 ft. per min., the rectangular tubes being cut to lengths of 20⅞ in.

Heater, Forging, Horizontal

American Car & Foundry Co., 30 Church St., New York, N. Y. (Vol.80,p.354.)

The "a.c.f. Berwick" Type "C" horizontal forging heater is designed for obtaining heat on the end of any material



ranging ¼ to 1 in. or more in diameter. The work is placed between electrodes, and a heated portion one and one-half times the diameter of the piece can be obtained. Temperature is controlled by photo-electric cell. An electric clock is provided to permit a soaking period if desired.

Forming Machine, Wire, High Production

Economy Tool & Machine Co., 10 W. Delano St., Muskegon, Mich. (Vol.80,p.353.)

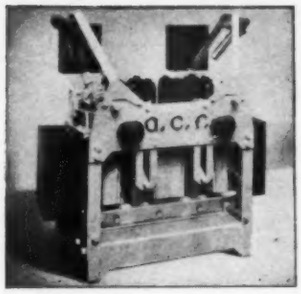
The "Multiplex" is an automatic machine for forming soft wire. Wire feeds into the machine from a reel, is automatically straightened, cut to the desired length and formed with

dies to specifications. The length of wire being produced and formed can be varied while the machine is in operation. Less than five minutes is required to change dies and adjust the machine for production. The capacity of the Multiplex is up to No. 10 gage and 21 in. in length. Production capacity is 100, 125, or 150 accurately formed wires per minute.

Heater, Forging, Electric, Type L

American Car & Foundry Co., 30 Church St., New York, N. Y. (Vol.80,p.829.)

The Type L "a.c.f. Berwick" forging heater is manually fed but is mechanically operated by a motor or pedal. Electrodes are movable blocks with con-

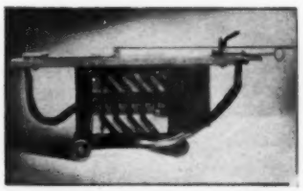


tact points. A camshaft controls the opening of the electrodes. They are closed by pushbutton control or by photo-electric cell control. When the heater is controlled by the electric eye, the jaws stay open 1½ sec. for the operator to remove the hot piece and insert a cold one. If he is not ready for the hot piece, the jaws close after 1½ sec. and the piece is brought back up to heat.

Heater, Bar Electric

American Car & Foundry Co., 30 Church St., New York, N. Y. (Vol.80,p.829.)

The "A.c.f. Berwick" 6-ft. electric bar heater will handle any diameter stock from ½ to 1 in. This heater has water-

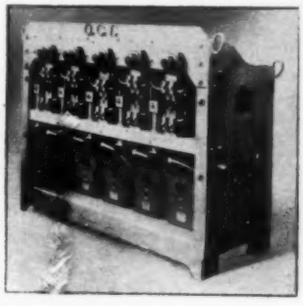


cooled electrodes, temperature control by photo-electric cell and an air cylinder for opening and closing the electrodes.

Heater, Slug, Electric

American Car & Foundry Co., 30 Church St., New York, N. Y. (Vol.80,p.638.)

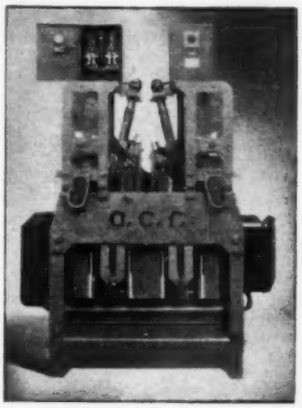
Electric eyes and an automatic kicking-out device are applied to the "a.c.f. Berwick" electric metal slug heater. It is only necessary for the operator to insert the piece which will then be heated and removed from the heater at the exact temperature required. The jaws have a vertical movement.



Heater, Slug, Electric, Hopper-Fed

American Car & Foundry Co., 30 Church St., New York, N. Y. (Vol.80,p.829.)

The fully automatic "a.c.f. Berwick" hopper-fed heater is available in two sizes. The No. 3 heater handles slugs from ¼ to 1 in. diameter while the No. 4 unit heats stock from

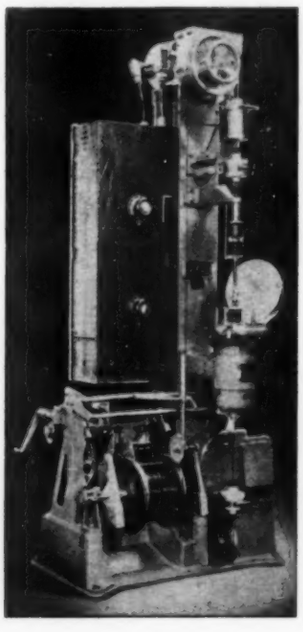


⅜ to 1¼ in. diameter with the blocks furnished. The shortest heat possible on the end of a piece is 1⅜ in. on all lengths from 4 to 24 in. Any length heat desired can be made at any point on the stock. Hoppers holding 70 pieces of ½ in. material are available for either or both sides of the machine.

Insulating Machine, Wire

Syncro Machine Co., 187 Sylvan Ave., Newark, N. J. (Vol.80,p.838.)

Insulation of various types can be applied to solid wires from No. 14 to 25 B & S gage by means of this gearless flyer insulating machine. It will ap-



ply cellulose ribbons to 0.00088 in. thick and paper ribbons 0.001 in. thick, as well as cotton, silk, celanese and other fibrous materials. Pay-off speeds ranging from 100 to 200 ft. per min. can be obtained.

Marking Machine, Tube, No. 24

Noble & Westbrook Mfg. Co., 20 Westbrook St., E. Hartford, Conn. (Vol.80,p.392)

A power marking machine is available to meet the special marking requirements of manufacturers of thin-walled metal hollow parts. The only operation required is to place the work on the pins which protrude from the revolving dial. Parts are

carried to the marking die, where they are marked, and then unloaded automatically. Distortion in marking is avoided by having the pins on the dial act as mandrels.

Molding Machine, Plastic, Injection

Reed-Prentice Corp., Worcester, Mass. (Vol.80,p.1054.)

Up to 400 shots per hr. can be made on the No. 10 hydraulic, injection-molding machine for the plastic industry. This gives a production of up to 500 cu. in. of molded material per hour, varying with the type of part being made. It is available for either manual or full-automatic operation. Pressure on the material is adjustable from 2,000 to 10,000 lb. per sq. in. Die plates are 18 x 20 in., and the die opening is 8 in. Maximum die space is 12 in.; minimum 4 in. Maximum injection area capacity of the mold is 24 sq. in.

Marking Machine, No. 24A

Noble & Westbrook Mfg. Co., 20 Westbrook St., E. Hartford, Conn. (Vol.80,p.972.)

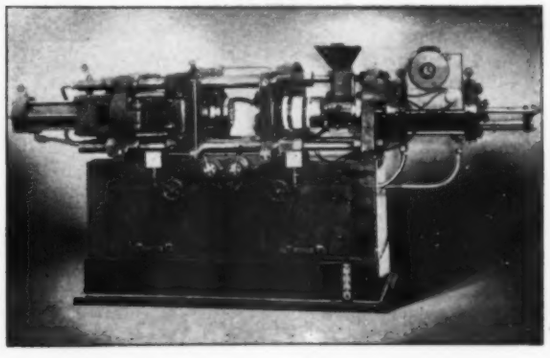
The No. 24A precision marking machine makes two different impressions at one time. Marking is by the rolling proc-

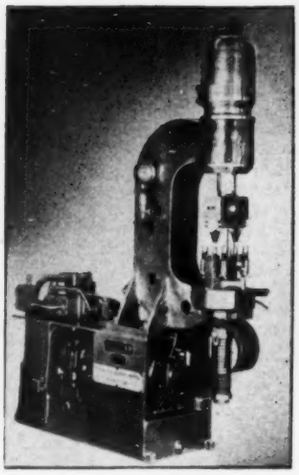
ess, the two die holders being mounted at different spots in the path of rotation. Capacity is 75 parts per minute marked with a double impression.

Riveter, Electric-Hydraulic

Hanna Engineering Works, Inc., 1765 Elston Ave., Chicago, Ill. (Vol.80,p.350.)

This electric-hydraulic riveter is self-contained, has flexibility of speed and load ratio, and features cushioned application of force and ability to take peak loads. The riveter is



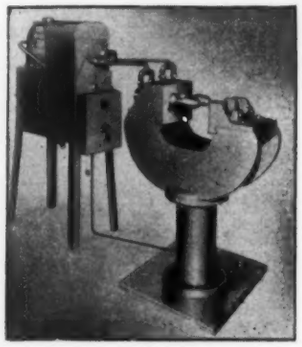


equipped with an Oilgear fluid-power pump direct driven by an electric motor through a flexible coupling. Initial work or closing movements are performed at high speed and low pressure. Maximum pressures may be regulated to the work.

Riveter, Hydraulic, "Hy-Power"

Hannifin Mfg. Co., 621 S. Kolmar Ave., Chicago, Ill. (Vol.80,p.529.)

Designed especially for an assembly operation on axle housings, the "Hy-Power" hydraulic riveting machine has duplex hydraulic rams. These are actuated from a hydraulic pressure-generator unit. A special work-holding fixture makes

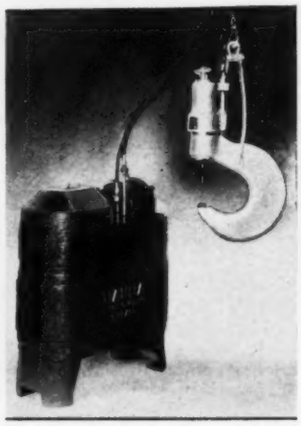


handling simple. The riveter ram develops 35,000 lb. pressure, ample for heading ⅝ in. cold rivets. Equal pressure is applied to head both rivets, regardless of rivet length. The machine heads more than 1,800 rivets an hour.

Riveter, Electric-Hydraulic

Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill. (Vol.80,p.1055.)

The electric-hydraulic riveters are available as portable or stationary units and are controlled by a switch at the operator's finger tip. The power unit is

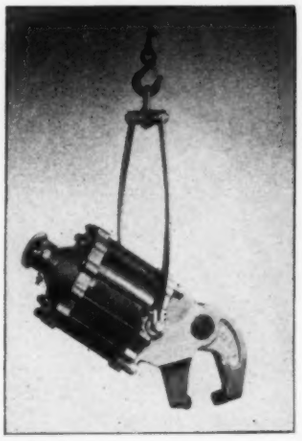


a combination of a motor-driven primary pump, a valve mechanism and an intensifier. Fluid pressure is transmitted to the riveter by a flexible high-pressure hose. It provides a rapid advance of the ram to the rivet, proper driving speed and rapid return of the ram.

Riveter, Portable, 10-Ton

Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill. (Vol.80,p.815.)

This light, compact alligator or nut-cracker type portable riveter weighs 100 lb., is rated at 10 tons. The jaw closes on the rivet with a uniform, prede-

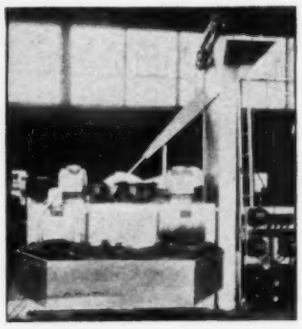


termined pressure, even when the variation in length of rivet and grip is as much as ½ in. It will drive ½ in. rivets cold, and ⅝ in. hot.

Shotblast Table, Multi-Rotary

American Foundry Equipment Co., 555 Byrkit St., Mishawaka, Ind. (Vol.80,p.284.)

The "Wheelabrator" multi-rotary table consists of a number of independent tables guided under the blast so that the work will obtain the full effective blasting range of the abrasive as it leaves the wheel. The vertical side of the table contacts a variable-speed belt

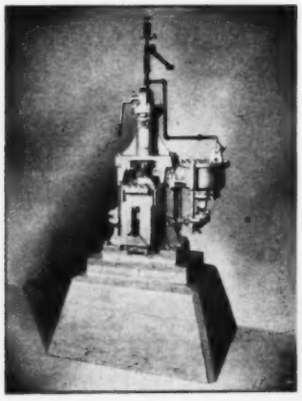


which revolves the tables as they pass under the blast. After traveling under the blast, the tables follow the track out of the cabinet where the material can be removed or turned over for a second application.

Straightener and Shear, Rod

American Foundry Equipment Co., 555 Byrkit St., Mishawaka, Ind. (Vol.80,p.1058.)

Designed for straightening rods, bolts, wire and nails, this machine is available in capacities ranging from ½ to 2½ in. diameter. The dies close as a

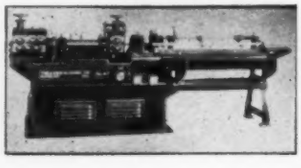


contracting square on the rod of bar, and deliver an impact on four sides simultaneously.

Straightening and Cutting Machine, Wire

Lewis Machine Co., 1592-1600 E. 24th St., Cleveland, Ohio. (Vol.80,p.390.)

The "Travel-Cut" flying-shear, automatic wire straightening and cutting machine feeds wire from the coil, straightens, gages to accurate length and cuts on the fly. This method, assures a uniform-diameter rod throughout the entire length and produces a rod that is free

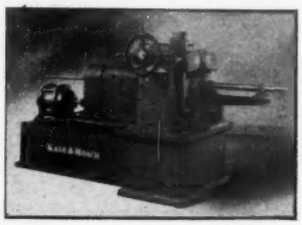


of feed-roll marks. The cut-off die is fastened to the traveling cut-off head. The cutting knife is operated by means of a quick-action cam on the flywheel shaft. This assures accurate lengths without critical adjustment.

Straightening Roll, Rotary, No. 2

Kane & Roach, Inc., Syracuse, N. Y. (Vol.80,p.780,)

Two power-driven straightening rolls are employed in the No. 2 rotary straightening roll to straighten stock at speed from 50 to 75 ft. per min.

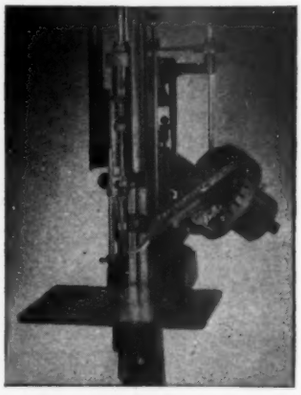


Capacity: Mild steel rounds, ¼ to ⅝ in.; heat-treated steel rounds, ¼ to ⅜ in., and tubing up to 1⅛ in. Shipping weight, 5,300 lb.

Screwdriving Machine, Barrel-Type Hopper

Detroit Power Screwdriver Co., 5365 Rohns Ave., Detroit, Mich. (Vol.80,p.598.)

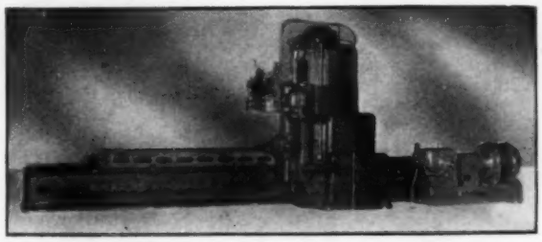
A universal barrel-type hopper makes the machine especially adaptable to short-length screws having large-diameter heads. The universal principle permits changing from one size of screw to another, in order



to take in the range of a No. 4 to a ¼ in. screw with but two sizes of collector rings. A friction clutch adjustable to any desired tension rotates the bit by drift only as it seeks the screw slot. This permits of driving small brass screws at high speed without marring the heads.

The hopper is shown with the hopper ring partially cut away in order to show the collector ring and the method of delivering screws to the storage tracks.

Planers and Shapers



Planer, Openside, "Hy-Draulic"

Rockford Machine Tool Co., 2500 Kishwaukee St., Rockford, Ill. (Vol.80,p.314.)

The "Hy-Draulic" planer uses hydraulic power for reciprocating the machine table. Rapid return-rate of the table is constant. Hydraulic pressure is used for feeding all heads. The feeds, like the cutting speeds, can be adjusted instantly to any desired rate within the capacity of the machine.

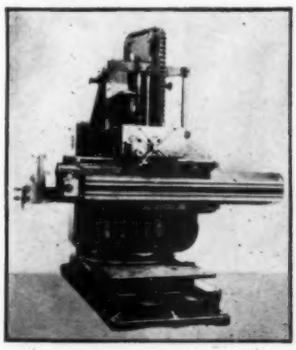
Maximum pull to the table is 24,000 lb.; maximum distance from table to underside of crossrail, 37½ in., and the length of the bed may be had from 23 to 45 ft. Horizontal adjustment of sidehead slide is 11 in. down adjustment of rail-head slide is 11½ in. Cutting speeds of the table may be adjusted from zero to 50 ft. per minute, or more. The return speed is optional from 10 to 150 ft., or more.

Shaper, Portable Collet & Engelhard

W. A. Schuyler, Fisk Bldg., 250 W. 57th St., New York, N. Y. (Vol.80,p.568.)

This horizontal shaper can be transported to the work for machining a small surface on a large piece. Controls are reduced to a minimum and are within easy reach of the operator. Power is from an 18-hp. motor coupled to the drive shaft by a magnetic clutch. Braking is done electrically. Variable-speed drive can be provided.

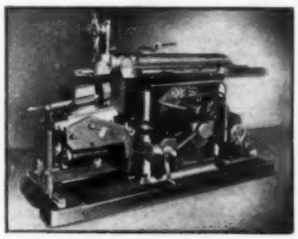
The cross-slide is 12 ft. 3 in. long and the maximum tool stroke is 6 ft. 6 in. The cutting speed can be varied from 19 to 39 ft. per min., and the return speed from 39 to 78 ft. per min. Vertical adjustment of the saddle is 4 ft. 7 in., with a maximum height of 6 ft. of the tool from the bottom of the bed. Force-feed lubrication is provided. The column swivels on a 56-in. diameter base. Total height is 12 ft. and the unit weighs 22 tons. The column can be moved by hand.



Shaper, "Dreadnaught"

Bryant Machinery & Engineering Co., 400 West Madison St., Chicago, Ill. (Vol.80,p. 394.)

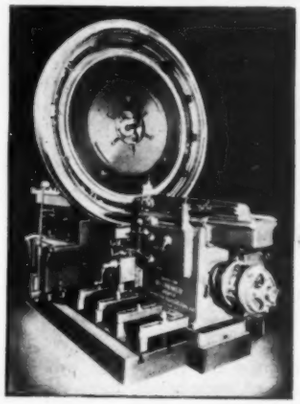
The Ohio "Dreadnaught" shaper is offered with rear-ranged controls to reduce the time lost in setting up for miscellaneous jobs. Feed control is located on the end of the rail, in connection with the power rapid traverse for the cross movement of the table and the vertical movement of the crossrail. A safety crank equipped with a dial graduated in thousands aids hand operation. Power rapid traverse control is by pushbutton. The stroke is automatically locked by removing the crank.



Shaper, Hydraulic, Internal Gear Set-up

Rockford Machine Tool Co., Rockford, Ill. (Vol.80,p.746.)

The standard "Hy-Draulic" shaper is shown set up to machine large circular work pieces which contain internal gears with 90-in. pitch circle, 2-in. face and 4-pitch teeth. The gear teeth are cut from the solid in three stages: gashing, forming and finishing. Specifications require that tooth form is not to be lapped or otherwise finished and that no marks should appear on the finished surfaces. The work piece is mounted on the arbor of an accurate indexing device. The index head and hydraulic shaper are mounted in accurate relationship on a heavy base.



Presses

Press, Inclinable, Series A-4

Niagara Machine & Tool Works, 637 Northland Ave., Buffalo, N. Y. (Vol.80,p.177.)

This open-back inclinable press is an adidtion to the Master Series line of punch presses. It has a 4-in. forged and ground main shaft. The design includes a quick-acting, six-point engagement clutch; a slide with breech-block die clamp and double, adjustable V-gibs; a self-contained anti-friction back-gear; compensating brake; and a one-man inclining device equipped with anti-friction bearings.

Press, Inclinable, Series A-1¼

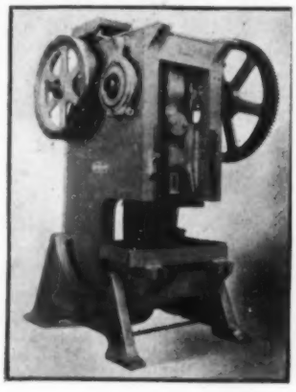
Niagara Machine & Tool Works, 637 Northland Ave., Buffalo, N. Y. (Vol.80,p.216.)

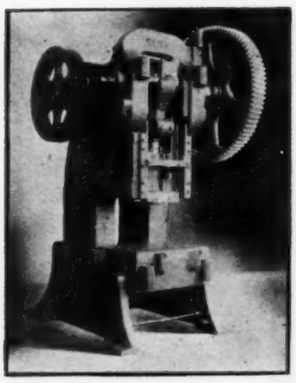
Designed so that there is practically no change in bed height when inclined, this Master Series. A press has a 1¾ in. crankshaft and is used for manufacturing light metal stampings. It is equipped with a 14-point engagement-sleeve-clutch and a positive-stop locking device and single-stroke mechanism. The breech-block die clamp gives solid support to the die under pressure.

Press, Inclinable, No. 11-1

Cleveland Punch & Shear Works Co., Cleveland, Ohio. (Vol.80,p.798.)

An all-welded steel frame, designed with box-section housings to afford maximum rigidity and minimum weaving, is employed in the No. 11-1 inclinable press. The press illustrated is of the single-gear type arranged for direct-connected motor drive. Its capacity is 115 tons. Bed area is 29 in. front to back by 40 in. right to left. Operation is at a speed of 40 strokes per minute.





Press, Inclinable

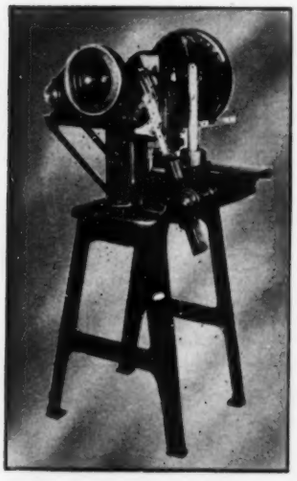
E. W. Bliss Co., Brooklyn, N. Y. (Vol.8,p.783.)

This heavy-duty, adjustable stroke inclinable press is single geared and is arranged for direct-connected motor drive. The stroke is adjustable for 2, 4 and 6 in. with a die space of 19 in. for 2 in. stroke, 18 in. for the 4 in. stroke and 17 in. for the 6 in. stroke. The adjustable eccentric is locked rigidly in place by a patented rolling key device.

Press, Punch, Automatic

Perkins Machine Co., Warren, Mass. (Vol.80,p.179.)

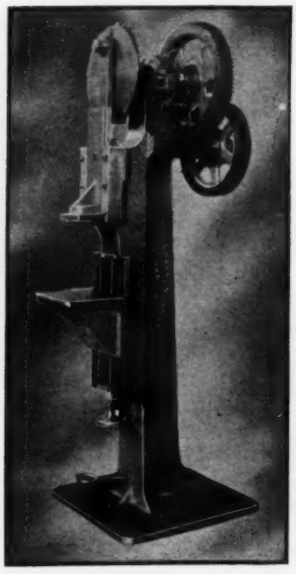
A slicer-feed attachment is fitted to this high-speed "Crimson Beauty" automatic press designed for light punch work. The press is equipped with motor-drive and with special gearing for slow feed.



Press, Punch, Long Stroke

Zeh & Hahnemann Co., 182 Vanderpool St., Newark, N. J. (Vol.80,p.392.)

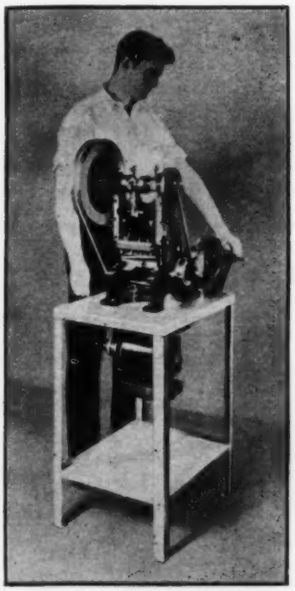
This long-stroke punch press is designed for comparatively light pressure work and has a stroke adjustable up to 10 in. The table also has a 10-in. adjustment. The distance from the center of the press to the edge of the frame is 5 in. This machine can be furnished plain or geared with a 1:6 ratio.



Press, Power, Bench Type

Flexo Machine Co., 2226-2230 N. Racine Ave., Chicago, Ill. (Vol.80,p.673.)

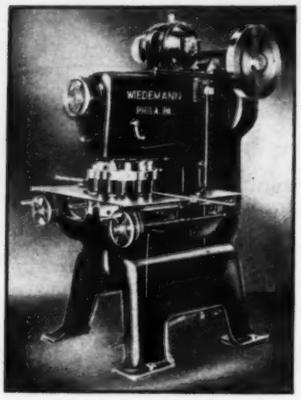
Model 400 "Flexopress" can be used for high-speed production of very small, light stampings such as clips, connectors, spacers and washers. It can also be used to cut wire, light metal and rolled material to uniform lengths up to 9 in., at high speed. A third application is the continuous perforating of metal, paper, cloth and foil. The press is entirely automatic once it is set up and started on a production job.



Turret Punch, Type R-5

Wiedemann Machine Co., 1815-31 Sedgley Ave., Philadelphia, Pa. (Vol.80,p.394.)

The Type R-5 heavy-duty, motor-driven turret punch has been specially arranged to punch knockouts in electrical conduit boxes, and is equipped with twelve knockout dies. All of these dies are instantly available by revolving the turret to bring the required size into the front position.

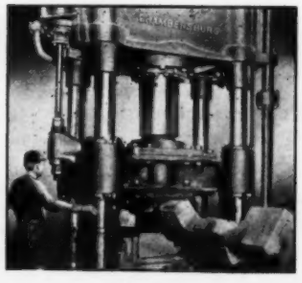


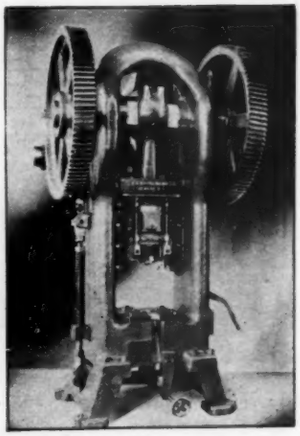
Any thickness up to No. 11 gage can be used. The machine has a depth adjustment to the ram to insure punching clear without breaking the slug out. The back gage bar is 78 in. long and is graduated in 32nds for 24 in. at each end.

High-Speed Press, Forging,

Chambersburg Engineering Co., Chambersburg, Pa. (Vol. 80,p.973.)

Heavy forgings are economically produced to a close degree of accuracy by these high-speed, steam-hydraulic forging presses. "United" presses are built in single-frame and four-column models. Essential elements are the press, the steam intensifier and the water reservoir or prefiller tank. Close control of the forging stroke is attained by a controlling gear attached to the intensifier. The single-frame press is built in 150-ton and 500-ton sizes. The four-column model is built as a single-cylinder press up to the 1,500-ton size, and as a duplex ram press in 2,000-ton capacities and over.





Press, Straight-Side, 200-Ton

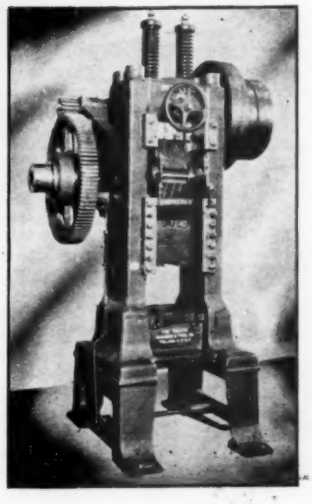
Zeh & Hahnemann Co., 182 Vanderpool St., Newark, N. J. (Vol.80,p.1089.)

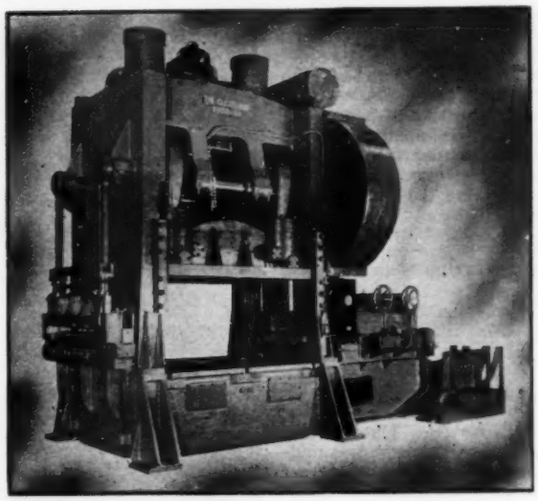
The frame and pitman of this 200-ton capacity straight-side type press are solid steel castings. A wedge adjustment is provided for the slide to insure accuracy. The crankshaft bearings are bronze bushed and the back shaft runs in heavy-duty ball bearings. The standard stroke of the press is 4 in., but it can be furnished with strokes up to 12 in. The distance between pillars is 25 in., bed area is 22 x 22 in., and the net weight is 10 tons.

Press Coining, 150-Ton

Toledo Machine & Tool Co., 1420 Hastings St., Toledo, Ohio. (Vol.80,p.971.)

This 150-ton tie-rod frame-knuckle-joint press is adapted for the sizing or cold finishing of forgings and other coining, extruding, swaging and cold squeezing operations. The uprights, crown and bed are of high tensile strength, pearlitic





alloy castings and are held together by steel "shrunk-in" tie-rods. Clutch is of the rolling-key type. Presses of this type are available in capacities from 25 to 2,500 tons.

Press, Straight-Side, Blanking and Forming

Cleveland Punch & Shear Works Co., Cleveland, Ohio. (Vol.80,p.68.)

This concern will build the four-point suspension press illustrated in any size. The press is designed with two shafts, each having two connections, one connection being located close to each corner of the slide. This arrangement, in conjunction with extra long gibs and other features, maintains alignment between the slide and the bed, whether the work is in the center or off center.

An electrically controlled, air-operated friction clutch and brake are part of the machine. Self-contained pneumatic draw cushions are mounted in the bed and the slide is air-counterbalanced. A compressor is mounted on top of the machine and all air units are independent of the plant supply. The press is equipped with a double-roll feed having supplementary straightening rolls and an automatic uncoiler.

A scrap cutter is provided for shearing off the waste after the piece is blanked or formed. The feed arrangement and press operation are synchronized through an interlocking system to insure feeding the proper length stock.

Trimmer and Beader for Stampings

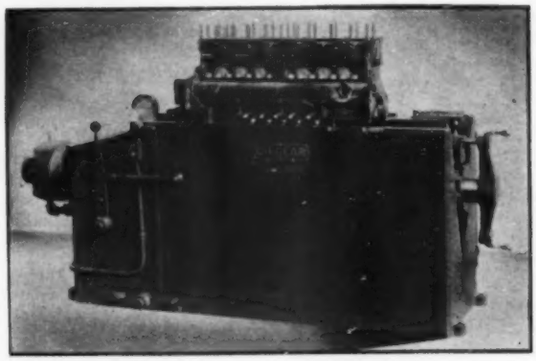
Quickwork Co., St. Mary's, Ohio. (Vol.80,p.32.)

This machine will trim the flash and bead the stamping in one operation and at one pass. It does accurate work on all stampings to be trimmed, beaded or flanged in one plane, regardless of whether the shape of the stamping is rectangular with round corners, or a round stamping.

Swaging Press, Horizontal, 100-Ton

Oilgear Co., 1403 W. Bruce St., Milwaukee, Wis. (Vol.80, p.563.)

Both ends of large steel truck housing tubes are cold swaged simultaneously from 6 to 4 in. in diameter in five passes on this 100-ton horizontal press. The housing tube is located and manually clamped in the center stationary fixture. Dies in the two opposing, five-station rotary-type supports are moved forward by the cross-heads to swage the tube ends.



Specifications: Capacity, each cylinder, 100 tons; stroke of each piston, 40 in.; distance between die blocks, 96 in.; maximum pushing speed, 135 in. per min.; net weight, 32,000 lb.

Press, Hydraulic, Assembly, 5-Ton "Pushemall"

Oilgear Co., 1403 West Bruce St., Milwaukee, Wis. (Vol.80, p.710.)

Accurate assembly of plain valve guide bushings to a predetermined depth and at a known press fit is accomplished on a high-production basis with this 5-ton two-column "Pushemall" press. For each press stroke four plain, solid valve-guide bushings are pressed into two air-cooled, gasoline-engine cyl-

inders. Positive stops limit the stroke of crosshead so the depth to which the bushings are pressed is accurately maintained. This eliminates the need of locating shoulders on the bushings and avoids excessive load or strain on the cylinders.

When the crosshead strikes the positive stops the control lever is released and the ram moves back to the starting position and comes to a stop automatically.

Press, Hydraulic, Bushing Assembly

Oilgear Co., 1403 W. Bruce St., Milwaukee, Wis. (Vol.80, p.898.)

This 15-ton press will assemble four camshaft bushings in six-cylinder motor blocks or five camshaft bushings in eight-cylinder motor blocks on a high-production basis. Both the horn-type pressing bar and the fixture for raising and lowering the cylinder block are hydraulically operated. A common conveyor line can be used for both the six- and eight-cylinder motor blocks, the machine being easily changed to suit the blocks in production. The adjustable stroke of this machine is 1½ in. Length of the machine is 96 in., width 52 in.

Press, Hydraulic, Assembly

Edwin E. Bartlett Co., Nashua, N. H. (Vol.80,p.902.)

The treadle-operated No. 60 BB, 15-ton Greenerd hydraulic press is specially designed for the assembly of ball bearings. When fitted with a suitable table it is adaptable for straightening operations. Any pressure from ½ to 15 tons may be obtained on the down stroke. Ram speed on the down stroke is at the rate of 36-in. per min. and the stroke is adjustable from 0 to 16 in. on the up stroke.

Press, Hydraulic, Arbor, No. 81

Edwin E. Bartlett Co., Nashua, N. H. (Vol.80,p.526.)

The No. 81 Greenerd hydraulic arbor press is self-contained, has variable pressure controls. Fifteen tons pressure is available on the down-stroke and thirteen tons on the upstroke. The control valve is either hand- or foot-operated. Automatic

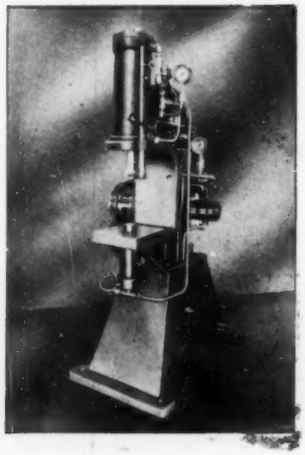
or manual reverse can be made at any point. A stop rod regulates length of stroke in either direction.

Platen working surface between uprights is 18x24 in. Clearance over working surface is from 17 to 30 in. as specified. Stroke is 17 in.

Press, Hydraulic, Assembly,

Edwin E. Bartlett Co., Nashua, N. H. (Vol.80,p.1095.)

The No. W60 Greenerd hydraulic assembling, clamping and riveting press features a second ram that operates through the working table and works in conjunction with the top ram. Specifications: working

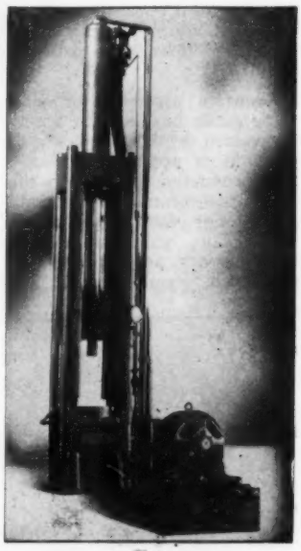


pressure, 15 tons; stroke at top ram, adjustable from 1 to 16 in.; stroke of bottom ram, 1½ in.; working table, 12x12 in.

Press, Hydraulic, Cupping and Drawing

Chambersburg Engineering Co., Chambersburg, Pa. (Vol. 80,p.1091.)

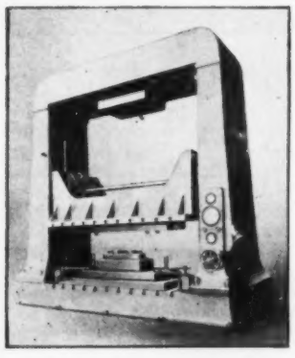
Featuring an automatic cycle control unit, this 100-ton hydraulic, vertical cupping and drawing press has a maximum stroke of 80 in., and a maximum depth of draw of 37 in. The bed of the press is 24x24½ in., and the top of the press bed is 33½ in. above the floor. Pushback or stripping capacity is 14 tons. The approach speed of 175 ft. per min. is automatically reduced to the normal drawing speed of 25 to 27 ft. per min. just before the punch starts the drawing operation. Location of the trip for this change of speed is adjustable.



Press, Hydraulic Die-Spotting

Baldwin - Southwark Corp., Philadelphia, Pa. (Vol.80,p. 673.)

This hydraulic die testing press is of the moving-down type, the platens being actuated

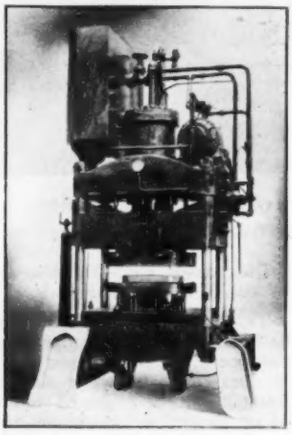


by two hydraulic rams, one in each column. Rams can be either single- or double-acting. When it is only necessary to close the dies single-acting rams suffice, but when pressure must be applied to the dies double-acting rams are required. The pumping unit is mounted on the top cross-member.

Press, Hydraulic, Drawing

Chas. F. Elmes Engineering Works, Morgan & Fulton Sts., Chicago, Ill. (Vol.80,p. 781.)

The No. 4282 "Duo" drawing press is designed for simultaneous production of different products. Individual adjustment of pressure applied on each cushion cylinder is featured. This press is designed for drawing large pieces of the

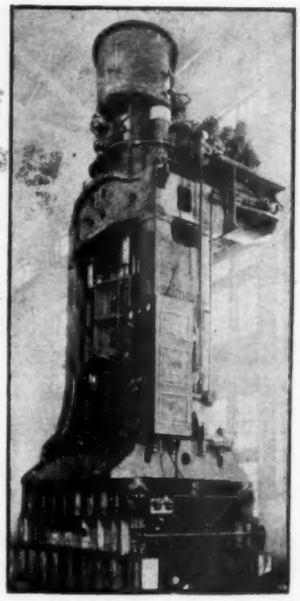


shallower type and permits the use of cheaper grades of drawing steel without loss from torn, sheared or wrinkled pieces. The capacity is 200 tons, stroke is 18 in., maximum opening is 34 in., platen surface 61x43½ in.

Press, Hydraulic, Deep-Drawing

Baldwin - Southwark Corp., Philadelphia, Pa. (Vol.80,p. 352.)

This "Hyspeed" hydraulic press is designed for deep drawing aluminum sheets. It is double-acting; the die descends at high speed until it contacts the blank, then it automatically slows down until the drawing has started and then speeds up, completing the operation at high speed. The over-all height is 36 ft. The "daylight" is 86 in., and clearance between columns is 84 in. Two double-acting push-down cylinders for draw work, and a main cylinder for the maximum setting tonnage are located in the inner slide. This slide exerts a maximum pressure of 1,000 tons and has a 50-in. stroke. Attached to this inner slide is

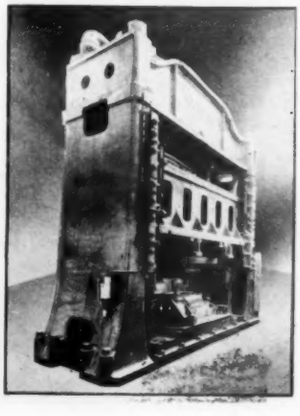


a stripping mechanism actuated by the up-motion of the slide. The outer slide, with 25-in. stroke and 320-ton maximum capacity, has two screw stops which can be adjusted for any required pressure on the clamping ring of the die.

Press, Hydraulic, 830 Ton

Baldwin-Southwark Corp., Philadelphia, Pa. (Vol.80, p.216.)

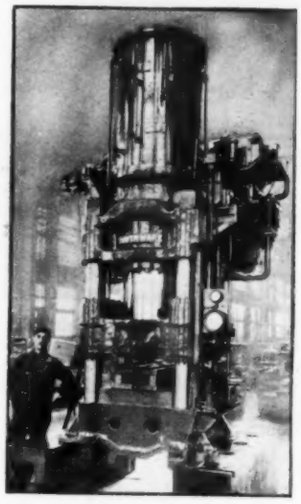
This is a 830-ton triple-acting hydraulic press using direct-acting cylinders. The press has a clear distance of 132 in. between guides and maximum daylight of 72 in. Four screw stops on the outer slide allow a varying amount of clamping pressure at each of the four corners. It has four 26-in. stroke cylinders, yielding 230 tons. The two draw cylinders in the inner slide produce a pressure totalling 600 tons. The inner slide has a working stroke of 42 in. The bottom action has a 12-in. stroke. It consists of a push-up cylinder and two main cylinders of 480-ton total.



Press, Hydraulic, Forming

Baldwin-Southwark Corp., Philadelphia, Pa. (Vol.80, p.315.)

Especially suited for pressing parts from hot steel, this 500-ton "Hyspeed" self-contained press can readily be adopted to forging and forming operations. Fifteen strokes per min. are possible. The stroke of

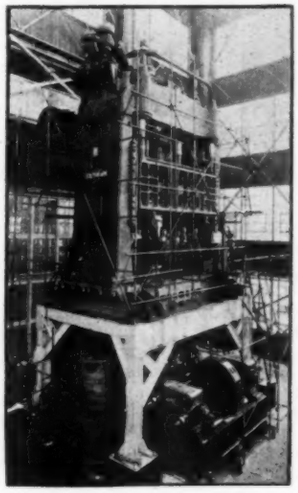


the moving platen can be set to any predetermined distance, and it can be set to stop and return automatically when a specified pressure has been attained under the die, or a predetermined height above the bottom dies has been reached.

Press, Hydraulic, Triple-Action

Baldwin-Southwark Corp., Philadelphia, Pa. (Vol.80, p.781.)

Practically four stories in height, this 1,000-ton triple-action hydraulic press has a clear distance of 191 inches between the side housings, while the vertical daylight of the inner slide is 140 inches, slide up.



The press stands more than 28 ft. off the ground. Approximate weight is 650,000 lb.

The press utilizes direct-acting hydraulic cylinders. Four cylinders are employed, each with a 42 in. stroke and yielding 400 tons. For eccentric loading, the inner slide is equipped with a horn-type guide. The cylinders acting upon the inner slide produce a pressure totaling 600 tons. A maximum working stroke of 62 inches is available for the inner slide. The bottom action, which has a 10 in. stroke, consists of two cylinders of 400 tons total pressure.

Press, Hydraulic, Vertical, 300-Ton

Oilgear Co., 1403 W. Bruce St., Milwaukee, Wis. (Vol.80, p.637.)

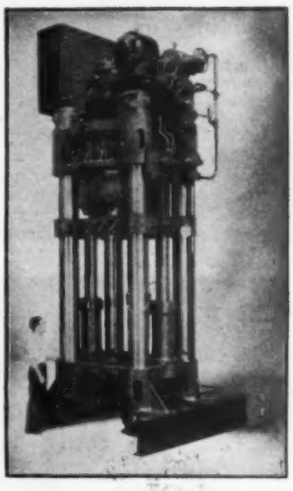
Automatic adjustable unloading control permits a variable capacity from 60 to 300 tons for this press. Pressing and return speeds are also variable. The frame is of welded steel. Two double-acting, rapid-traverse cylinders, one attached to

each side of the cross-head, are mounted in the frame. The Oilgear pump and 20 hp. drive motor are mounted on top. Specifications are: stroke, 8 in.; daylight, 26 in.; approach speed, 195-in. per min.; pressing speed, 15-in. per min.; return speed, 260-in. per min. Width between guides, right to left is 24 in., and the base, front to back, is 30 in. deep.

Press, Hydraulic, Forming

Charles F. Elmes Engineering Works, Morgan & Fulton Sts., Chicago, Ill. (Vol.80,p. 904.)

This 2,000-ton hydraulic press is designed for heavy-duty metal forming. It is also suitable for compressing and dehydrating various products. The press is entirely self-contained; the oil reservoir, motor driven pumping unit and



automatically controlled four-way valve being mounted on top. Ram is 42 in. diameter and has a 24 in. stroke. Platen surface is 38x64 in. and the maximum opening between ram and platen is 92 in.

Press, Hydraulic, Molding

Farrel-Birmingham Co., Inc., Ansonia, Conn. (Vol.80,p.176.)

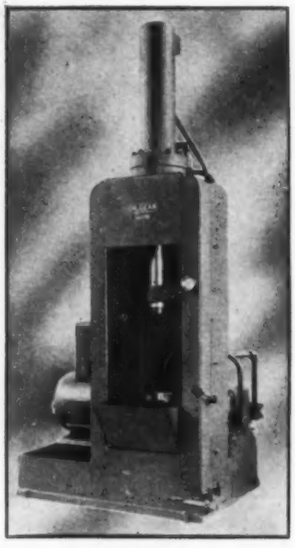
This self-contained 100-ton hydraulic molding press is designed for molding plastic and rubber parts, but can be used for other operations. Platens are 20-in. square and the open-

ing between platens is 12 in. The variable - displacement pump and driving motor are mounted on a bedplate over the top crosshead. Rolled steel slabs serve as tension members between the top and bottom crossheads.

Press, Hydraulic, General-Purpose

Oilgear Co., 1403 W. Bruce St., Milwaukee, Wis. (Vol.80p. 392.)

This 35-ton, two-column hydraulic press is designed for broaching, assembling, straightening and general manufacturing purposes. The illustration shows the press set up for broaching a rear-axle housing



tube. The press features welded-steel construction and inclosed control mechanism.

Press, Hydraulic, Molding

Farrel-Birmingham Co., Inc., Ansonia, Conn. (Vol.80,p.252.)

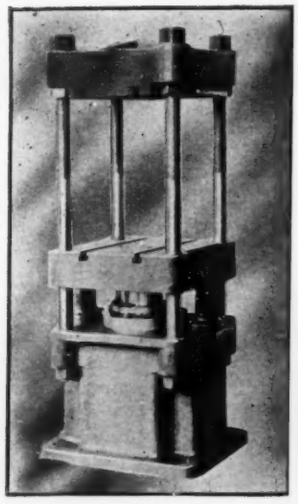
Made especially for plastic and rubber molding operations, this self-contained, 140-ton hydraulic press can be used for other work. Only one valve is used to operate the press.

Maximum pressure adjustment is made by the control handwheel on the pump and can be positively set. Platens are 60x30 in., and the two 8-in. rams provide 150 lb. per sq.in. pressure over the platen area. The cylinders are integral with the bottom crosshead.

Press, Hydraulic, Molding

Defiance Machine Works, Defiance, Ohio. (Vol.80,p.525.)

This four-column, 75-100 ton hydraulic press is designed for molding plastics, rubber and similar products. Upper and lower platens are 26x24½ in. and have two T-slots running from front to back for mounting the molds. The upper

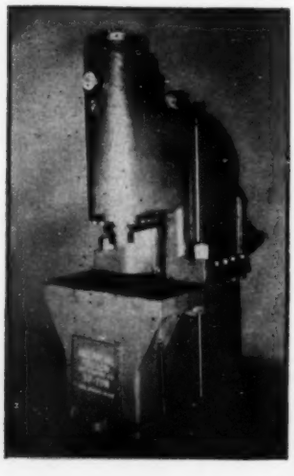


platen is adjustable to give from 12- to 24-in. between platens. The lower platen slides on the four columns. Space between columns is 18x16½ in. The main ram is 9-in. diameter and gives a 12-in. stroke to the lower platen. Pull-back cylinders return the lower platen. Specifications: required floor space, 30x25 in.; overall height, 70 in.; net weight is 3,680 lb.

Press, Hydraulic, Straightening

American Broach & Machine Co., Ann Arbor, Mich. (Vol.80, p.256.)

Embodying features of rapid advance, slow pressure stroke and rapid return, this 50-ton hydraulic straightening press weighs approximately 11,000 lb. It is powered with a 7½-hp. motor that is connected to a



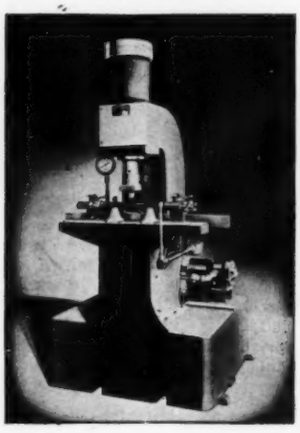
two-stage pump through a flexible coupling.

The table is 26-in. wide and 18-in. deep. Down-stroke of the 6-in. ram is 104 in. per min.; the pressure-stroke travels 23 in. per min. and the up-stroke is at 132 in. per min.

Press, Hydraulic, Straightening

Hannifin Mfg. Co., 621 S. Kolmar Ave., Chicago, Ill. (Vol.80,p.1094.)

This 20-ton hydraulic straightening press has a single lever control mechanism with a sensitive proportional control action. A variety of fixtures are available. The ram stroke



is 6 in., speed of power stroke is 69 in. per min., speed of return stroke is 96 in. per min. The hydraulic power unit is built into the base of the press.

Press, Hydraulic, Utility

Baldwin-Southwark Corp., Philadelphia, Pa. (Vol.80, p.283.)

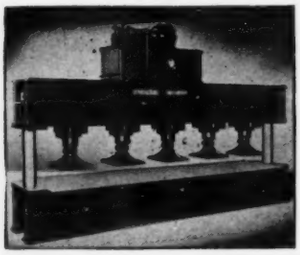
This 75-ton "moving down" type press is designed for forcing bushings in or out, pressing and forming small parts and similar operations. When occasion demands, it can be adapted to production operations. A single lever starts and stops the machine, holds the ram in any desired position and regulates the speed. Overloading is prevented by a safety valve. Hydraulic pressure

is furnished by a rotary, motor-driven pump mounted on the bed above the oil tank.

Press, Hydraulic, Multiple-Platen

Hannifin Mfg. Co., 621 S. Kolmar Ave., Chicago, Ill. (Vol.80,p.1054.)

This 80-ton multiple-platen hydraulic press was developed for high-pressure gas testing of welded refrigerator body



tanks on a production basis. Tanks are placed on the bed of the press and the necessary number of platens are moved down into contact with the tank top. Each platen is individually controlled. Platens in use are automatically held in position at a predetermined pressure, regardless of the testing pressure applied inside the tank.

Jack, Hydraulic, Utility 20-Ton Unit

Black Hawk Mfg. Co., Milwaukee, Wis. (Vol.80,p.602.)

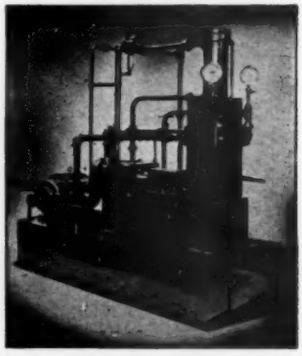
This is a 20-ton hydraulic jack. It is a unit of the "Port-to-Power" line (*AM*—Vol. 79, p.347). It consists of a pump and ram separated by a reinforced flexible hose. The ram is adaptable for vertical lifting

or downward pressing in a press frame as shown. Collapsed the height is 10¼ in., the plunger travel is 4½ in., and a screw extension of 3¾ in. gives an over-all height of 18 in. The ram can be operated in crowded quarters, the over-all diameter of the unit being only 4 in.

Press, Hydraulic, Upsetting

Charles F. Elmes Engineering Works, Morgan & Fulton Sts., Chicago, Ill. (Vol.80,p. 1055.)

These self-contained hydraulic upsetting presses can be used for upsetting bars and tubes and for forming operations that require split dies.

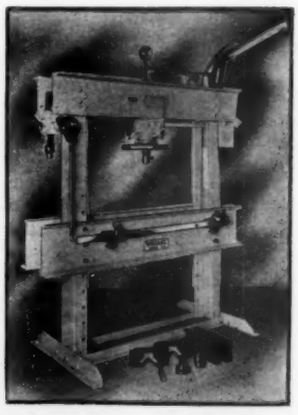


Up to 30 strokes per min. can be made. An overhead cylinder is used for clamping the work while the horizontal ram performs the upsetting operation.

Press, Hydraulic, Utility

Wright Mfg. Div., American Chain Co., York, Pa. (Vol.80, p.25.)

This 60-ton hydraulic utility press is designed with open sides for taking work of any length. An independent arbor press is mounted at one end of the frame. Two hand-operated hydraulic pumps are mounted on top of the machine,



one for fast work at moderately heavy pressures and the other for extremely heavy pressure. Over-all height is 7 ft.; floor space, 36x69½ in.; width between uprights, 45 in.; table travel, 28 in., with winch operation. Maximum distance between the lowest position of the table and the collapsed screw and ram is 37 in.

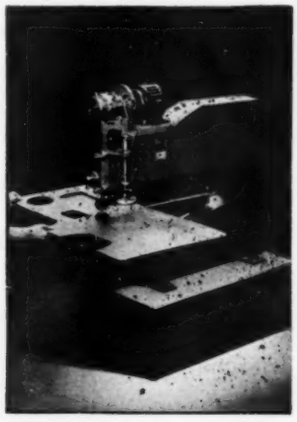
The 25- and 40-ton hydraulic presses are of similar design and construction.

Shears and Brakes

Squaring Shears, Series BL

Niagara Machine & Tool Works, Buffalo, N. Y. (Vol. 80,p.637.)

The Series BL Niagara power squaring shears are built in 8-, 10- and 12-ft. cutting lengths with capacities of 10 to 12 gage. They are of the underdrive design. The crosshead is directly connected to

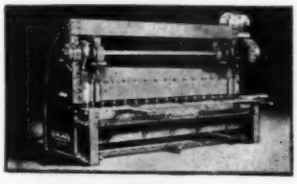


the eccentrics by connecting rods, relieving the housings of tension stresses. The cutting line is clearly visible from the front between the pressure hold-down feet as well as from a position vertically above the cutting edge.

Squaring Shears, Series HL

Niagara Machine & Tool Works, Buffalo, N. Y. (Vol. 80,p.819.)

The Series HL power squaring shears are designed for accurate flat strip cutting. A heavy steel plate structural member is bolted and doweled to the top of the housings to counteract the upward thrust



of the center bearings and the direct thrust from the hold-down mechanism. This member ties the entire machine together at the upper end. The bed is adjustable front to back. The hold-down is toggle operated and has independent feet exerting increased pressure.

Shear and Nibbler

Henry Pels & Co., 90 West St., New York, N. Y. (Vol. 80,p.839.)

This Type AS combination metal shear and nibbler is available in three sizes. It will split and trim plates along the edges and will shear without pre-punching any curved or irregular shape inside the plate. Special shapes are cut with a nibbling punch furnished. Tools have been developed for flanging, beading and offsetting operations. The cutting head can be turned a full 360 deg. and can be locked in one of eight positions. No. 3 size has $\frac{3}{32}$ in. cutting capacity; No. 4, $\frac{1}{8}$ in.; No. 6, $\frac{3}{16}$ in.

Press Brake, 4-Ft.

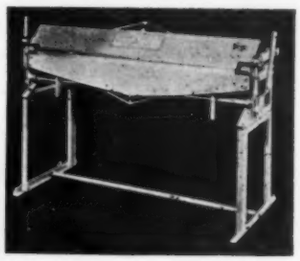
Whitney Metal Tool Co., 105 Mill St., Rockford, Ill. (Vol. 80,p.1059.)

The Whitney-Jensen No. 47-4 ft. power press brake has a capacity for making a right-angle bend 48 in. long in 14-gage mild steel. Die surface is 50 in. long and the clear distance between housings is 37 in. There is a 6½ in. throat clearance from the center of the die.

Bending Brake, Portable

Whitney Metal Tool Co., 105 Mill St., Rockford, Ill. (Vol. 80,p.320.)

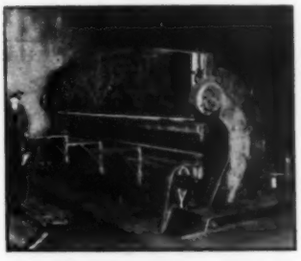
This bending brake, 4 ft. 1 in. long and weighing only 265 lb., is light enough for two men to carry from job to job. Its capacity is 20 gage commercial iron used in air-conditioning work. Turnbuckles are used for adjusting for various thicknesses of material, and a graduated scale at the hinge lugs is provided for duplicating work.



Press Brake

Boom Boiler & Welding Co., Cleveland, Ohio. (Vol.80,p. 353.)

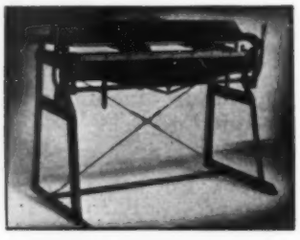
This 500-ton steel press brake is capable of bending materials 16 ft. long. It pulls the two leaves together instead of pushing one leaf down. The brake is 24 ft. 2 in. long over-all, 16 ft. 1 in. long between housings, 7 ft. 1 in. wide, 9 ft. 11 in. high, and 6 ft. 9 in. high above the floor. It weighs 61 tons. The two leaves of the brake are 17 ft. 7 in. long, 4 ft. high and 10 in. thick.



Bending Brake, Portable

Whitney Metal Tool Co., 105 Mill St., Rockford, Ill. (Vol. 80,p.970.)

The "Air Conditioning Special" portable bending brake has been improved by adding fingers for box and pan bending. Capacity is 49 in. of 20 gage metal. The jaw can be raised and shifted back to accommodate box fingers when required.



Threading Machines

Tapping Machine, Heavy-Duty

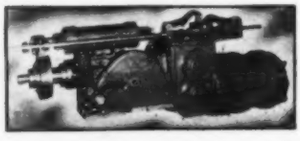
R. G. Haskins Co., 4630 W. Fulton St., Chicago, Ill. (Vol. 80,p.255.)

The No. 4 heavy-duty tapper handles taps from $\frac{1}{16}$ to $\frac{3}{4}$ in. in diameter in brass, and from $\frac{1}{16}$ to $\frac{5}{8}$ in. diameter in steel, where the work consists of light-weight castings, forgings, stampings and screw-machine products. The head is driven by a special 1-hp. motor, operating at 1,725 r.p.m., through pulleys providing three tap speeds of 550, 750, and 1,000 r.p.m. Reverse speed is double that of the tapping speed.

Tapping Unit, No. 3

Milholland Sales & Machine Co., Indianapolis, Ind. (Vol. 80,p.818.)

Equipped with either a 2-, 3- or 5-hp. motor, the improved No. 3 automatic unit will tap six $\frac{1}{4}$ in.-20 threads in steel, or $\frac{5}{8}$ in.-11 threads in malleable iron. The unit is equipped with

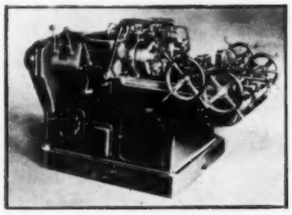


positive clutches to reverse at 500 r.p.m. and positive toggle lock on the reversing clutch. Shockless reversing is provided by adjustable friction in the hub of the main driving gear.

Threading Machine, Double Head, Model 35

Acme Machinery Co., Cleveland, Ohio. (Vol.80,p.710.)

The Model 35 double-head unit is a high-production threading machine with a self-contained selective-type gearbox for speed changes. Lead-



screw drive to the carriage is used to insure accurate lead and to facilitate cutting heavy coarse-pitch threads. Various pitches are obtained through pick-off gears. Acme tangent dieheads are employed.

Threading Machine, Double-End

Murchey Machine & Tool Co., 951 Porter St., Detroit, Mich. (Vol.80,p.1095.)

This double-end, manually-operated threading machine has a capacity for studs up to 39-in. long. The self-opening dieheads, using tangential chasers, have live centers which aid in

maintaining thread concentricity. Loading is done manually, while unloading may be performed by the operator or by an automatic unloader.

Threading Machine, Pipe, No. 8-XHD "Rapiduction"

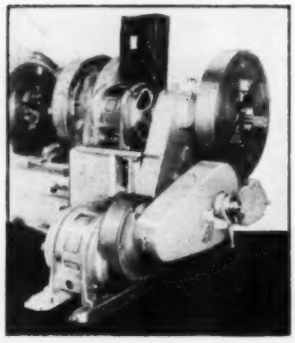
Oster Mfg. Co., Cleveland, Ohio. (Vol.80,p.567.)

This heavy-duty machine is designed for threading and bucking-up work on all sizes of pipe from 2½ to 8⅝ in. Spindle speeds, from 3 to 87 r.p.m. A standard "Rapiduction" diehead is used to handle the full range with only one set of chasers for each pitch. The carriage has a maximum travel of 28 in., is equipped with a thread length gage and has suitable means of wear adjustment. Equipped with a lead-screw and gears for the four changes, it is possible to handle pitches of 8, 10, 11½ and 14 per in. Taper attachment with ⅛, ⅜ and ¾ in. taper is provided.

Threading Machine, Pipe

Landis Machine Co., Waynesboro, Pa. (Vol.80,p.180.)

A dual-speed arrangement has been developed for the pipe threading and cutting machine with receding-chaser diehead. This equipment pulls the joints tight on drill pipe used in oil fields. Two separate



motors are used, one for the thread cutting and the other to perform the "bucking up" required in this type of work. A friction clutch drives the machine at threading speeds, and a tooth clutch transmits power from the low-speed motor for the "bucking up."

Pipe Cutter, No. 4 Geist

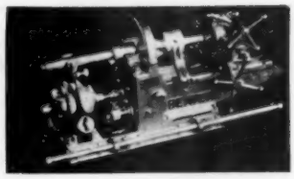
Landis Machine Co., Waynesboro, Pa. (Vol.80,p.904.

The No. 4 Geist roller pipe cutter has been improved by mounting the cutter disk shaft in Timken roller bearings instead of in bronze sleeve bearings. This change results in a stronger construction and reduce the frequency of adjustments to compensate for bearing wear. The No. 4 unit has a capacity for cutting off pipe within a range of ¼ to 4 in.

Pipe Machine, Model A

Beaver Pipe Tools, Inc., Warren, Ohio. (Vol.80,p.255.)

The Model-A pipe machine is designed to cut, thread, ream and chamfer all sizes of pipe from ⅛ to 2 in. It will operate geared tools to cut and thread 2½ to 12 in. pipe and will cut-off solid round bars or stayrods ½ to 1 in., and



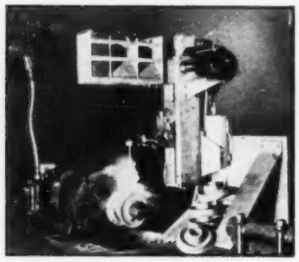
thread bolts and stayrods from ¼ to 2 in. The knives feed automatically.

Welding Equipment

Arc Welder, Automatic

Harnishfeger Corp., Milwaukee, Wis. (Vol.80,p.974.)

Using standard coated rods, the P & H arc welding robot makes possible increased speed in production welding. This unit can be used on flat work of any length, on circular pieces and, with pantograph attach-

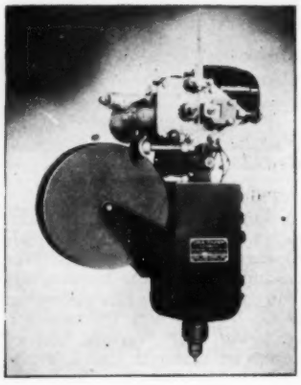


ment, for any shape. It is adaptable for use on lathes, planers, rotating tables, boring mills and, with wall cranes, for welding long girders. Up to 50 standard coated rods are loaded in a magazine and then fed automatically to the welding position.

Arc Welding Head, Automatic

Una Welding, Inc., 1615 Collamer Ave., Cleveland, Ohio. (Vol.80,p.1093.)

The all-electric type Una automatic arc welding head automatically feeds electrode wire from a 150- to 200-lb. reel and automatically maintains the proper arc voltage. As the head feeds the wire down through the taping unit a separate tape is fed into the taper and is completely bound around the wire just ahead of the arc. This tape adds the necessary coating to the partially coated electrode to produce shielded arc weld metal.



Arc Welders

Eisler Engineering Co., 750 S. 13th St., Newark, N. J. (Vol.80,p.603.)

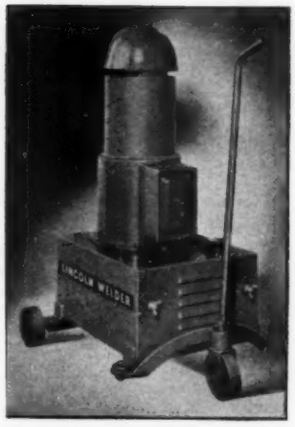
Portable and stationary arc welding units are available in three sizes—40-200 amp., 50-300 amp., and 75-400 amp., in models having 11- and 21-point

controls. The units take 1/16- to 3/160-, 3/32- to ⅛-, and ⅛- to 5/32-in. electrodes, respectively. Special air ducts built into the transformer assure natural ventilation.

Arc Welder, "Sa-150"

Lincoln Electric Co., Cleveland, Ohio. (Vol.80,p.779.)

Designated as the "SA-150," this motor driven, single-operator arc welder for general fabrication and repair work has a current range of 45 to 200 amp. It is intended for metal work, hard-facing, pipe welding, cast-iron repair fit-up

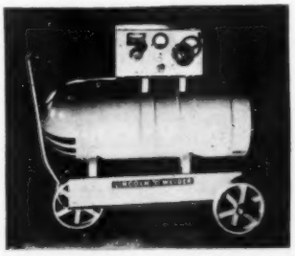


and auxiliary work in shops where heavy welding predominates. Regular production welding involving steel, alloy and non-ferrous plates and shapes can be done.

Arc Welder, Dual-Control

Lincoln Electric Co., Cleveland, Ohio. (Vol.80,p.836.)

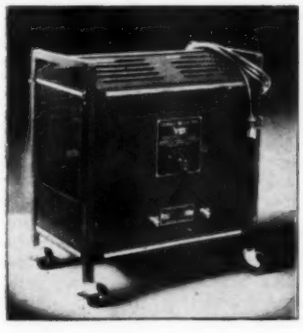
A line of dual-control, single-operator arc welders, provides close control of arc heat and arc penetration in a continuous sequence of fine increments. Dual control permits the economy of correct voltage and current for any class of work in the range of each size of welder in the line.



Arc Welder, D.C., Low-Range

General Electric Co., Schenectady, N. Y. (Vol.80,p.1023.)

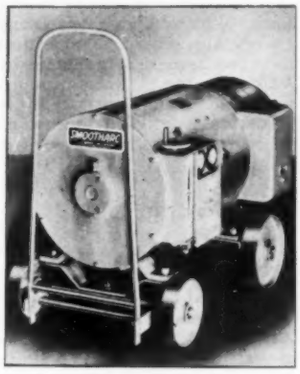
This low-range, d.c. welder utilizes rectifier bulbs instead of rotating equipment, has ample capacity for all light-gage car or truck parts in construction and maintenance work. Using four mercury-Tungar bulbs, the unit operates on three-phase, 50- or 60-cycle 230-, 440- or 550-volt circuits.



Arc Welders, "Smootharc"

Harnischfeger Corp., 400 West National Ave., Milwaukee, Wis. (Vol.80,p.1059.)

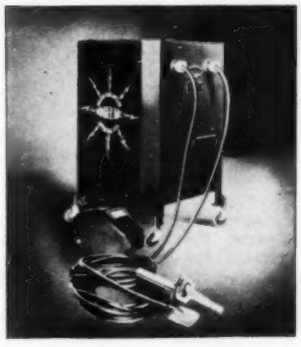
The P. & H. "Smootharc" line of arc welders feature simplified design, single current control, self-excitation and internal stabilization. These welders are built in vertical and horizontal types for either stationary or portable mounting.



Arc Welder, Portable

Miller Electric Mfg. Co., Appleton, Wis. (Vol.80,p.1093.)

"Wonder Arc" portable a.c. welders are of a special transformer type with capacities ranging from 125 to 600 amp. They are designed for use with 220 volt, 60 cycle, single-phase supply. Amperage control is provided by a rotating knife switch. These machines can be used for welding on grounded systems.



Arc Welders, "Giant Grip Junior"

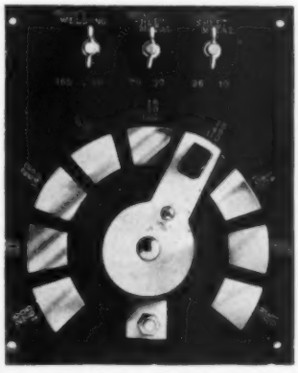
Giant Grip Mfg. Co., Oshkosh, Wis. (Vol.80,p.1096.)

The "Giant Grip Junior" line of a.c. welders includes four units with capacity ranging from 90 to 300 amp. These arc welders are lighter in weight than the standard models and, as they are not of the auto-transformer type, they can be used on grounded systems.

Welder Switch, Rotary Knife

Miller Electric Mfg. Co., Appleton, Wis. (Vol.80,p.674.)

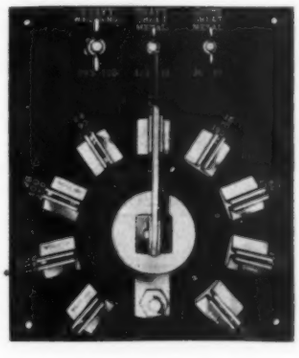
This rotary knife switch control for a.c. welders brings all the amperage changes under one switch arrangement. The dial is distinctly marked in amperes. Contact between knife blade and the welding lead is made through a large copper disk. The switch can be rotated in either direction.



Switch Control, Arc Welder

Miller Electric Mfg. Co., Appleton, Wis. (Vol.80,p.254.)

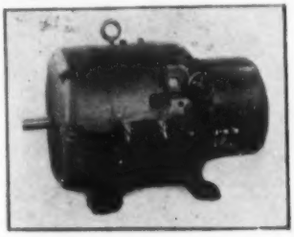
This simple dial switch control for arc welding equipment has the amperage clearly marked on the switchboard, indicating each step in welding. When the dial is set at its proper figures, positive control of the amperage is assured.



Welding Generator

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. (Vol.80,p.599.)

This welding generator for belted or coupled welding sets uses the "cross-field" principle, and the operator can adjust the generator to give the required welding current before the set is started. Control is stepless, permitting minute changes in current adjustment. A polarity reversing switch is provided. Three sizes are available: 200, 300 and 400 amp.



Press Welder, Special

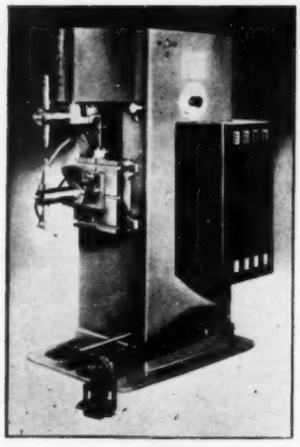
Thomson-Gibb Electric Welding Co., 261 Pleasant St., Lynn, Mass. (Vol.80,p.527.)

This resistance welder has been developed to weld two thicknesses of ⅞ in. corrosion-resisting steel plate at a production rate of 30 to 40 spots per min. It is the split-type head, equipped with a hand lever so that the upper electrode can be located on the work with accuracy before the power-driven, mechanically operated pressure device goes into action. The lower arm is adjustable vertically through a range of 24 in.

Resistance Welders, Press-Type

Eisler Engineering Co., 750 S. 13th St., Newark, N. J. (Vol.80,p.778.)

A line of large press-type resistance welding machines, available up to 250 kva., in foot, motor or air operated models,

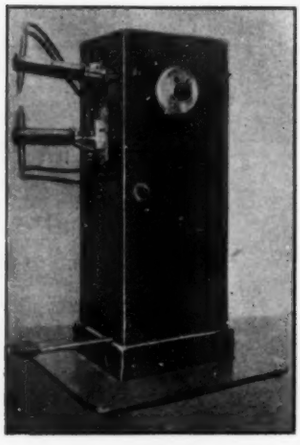


has been announced. These machines are intended for handling various thicknesses of metal and are made in throat depths from 16 to 48 in. They may be had with speed changes ranging from 30 to 100 welds per min.

Spot Welder, Fabricated Box-Type

Eisler Engineering Co., 750 S. 13th St., Newark, N. J. (Vol.80,p.523.)

Fabricated box-type welders are made in sizes from 35 to 250 kva. They are intended for handling various classes of sheet-metal work of varying thickness, either intermittently

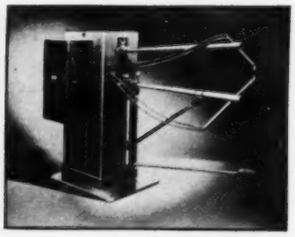


or on a production basis. These units may be had in either foot-operated or motor-driven models with speed changes ranging from 30 to 100 welds per min. Throat depths from 12 to 36 in. are available.

Spot Welder for Neon Signs

Eisler Engineering Co., 750 S. 13th St., Newark, N. J. (Vol.80,p.901.)

This special welding machine is designed to meet the particular needs of the neon-sign industry. It is adapted for the welding of frames, letters and



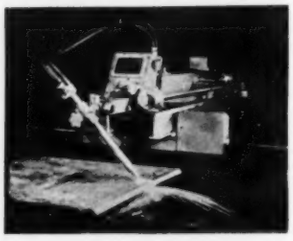
other accessories for the erection of signs.

The welding horns are 48 in. long and the water-cooled electrode holders are angled to permit welding in corners or along edges. Adjustment between electrodes is obtained by raising or lowering the lower horn. These units are available in foot-, air- or motor-operated models in sizes up to 250 kva. With motor drive, this welder is capable of 30 to 100 welds per min.

Shape Cutting Machine, "Oxweld"

Linde Air Products Co., 30 E. 42nd St., New York (Vol. 80,p.836.)

This CM-12 percision oxacetylene shape-cutting machine has increased cutting capacity. It is designed to cut simple or complicated shapes either automatically or guided by hand.

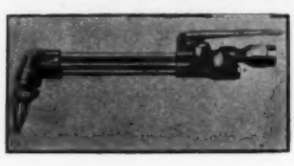


Straight-line work in any direction and at any bevel up to 144 in. long, and circles from 2 to 24 in. radius can be produced, either set for single or multiple cutting.

Cutting Attachment, Blowpipe

Linde Air Products Co., 30 E. 42nd St., New York (Vol. 80,p.530.)

The "Oxweld" Type CW-22 cutting attachment can be used on either the Type W-17 or W-22 welding blowpipe handle, thereby extending the utility of these two blowpipes. The attachment is designed to handle light sheet metal as well as all but the heaviest work at speeds and efficiency equal to those of the full-size cutting blowpipe. It operates on low- or medium-pressure acetylene.



Electrode Holder

Jackson Electrode Holder Co., 6553 Woodward Ave., Detroit, Mich. (Vol.80,p.676.)

Replaceable jaws of Jackson ventilated welding electrode holders are made of Mallory 3 metal, the same metal that is used for spot welder tips and

flash welding dies. Insulating covers are provided to protect the jaws against arcs caused by striking the jaws against grounded metal parts. These holders are designed for use up to 300 amp.

Hard Facing

Colmonoy Co., Inc., Los Nietos, Cal. (Vol.80,p.595.)

A method of applying "Sweat-On" crystals with furnace heat has been perfected. Colmonoy Sweat-On consists of a mixture of chromium boride crystals and a metallic boride. This crystalline mixture, when applied to steel or cast iron, forms a non-oxdiziing wear- and corrosion-resistant skin.

The furnace process consists in covering the surface to be treated with a thin layer of the crystals dampened with 3 parts of water and 1 part sodium silicate to form a paste. This is allowed to air dry thoroughly and then is brought up to approximately 2,250 F. in the non-oxydizing atmosphere.

Welding Electrode, "Stainweld B"

Lincoln Electric Co., Cleveland, Ohio. (Vol.80,p.34.)

"Stainweld B" electrode is for welding stainless steels belonging to the 25-12 variety. Because of its higher chromium content the electrode is also suitable for welding the stainless-clad materials. The weld metal has high corrosion resistance. high tensile strength and ductility.

This electrode is heavily coated and operates on the shielded-arc principle. The weld metal resists a stress of 95,000 lb. per sq.in. It is made in $\frac{1}{32}$- and $\frac{1}{16}$-in. sizes.

Welding Electrode, Phosphor-Bronze

Lincoln Electric Co., Cleveland, Ohio. (Vol.80,p.252.)

"Aerisweld," a phosphor-bronze arc-welding electrode, provides a solid, homogeneous deposit, with the characteristics of true phosphor bronze of high tensile strength. It is a shielded-arc electrode for use trode is made in $\frac{1}{32}$- and $\frac{1}{16}$-in. with the metallic arc. The elecsizes by 14 in. long.

Welding Electrodes, D.C.

Harnischfeger Corp. Milwaukee, Wis. (Vol.80,p.600.)

Coated rods for d.c. welding are now being made in five types. These have both high and low rates of fluidity for various types of work in welding with flat, vertical or overhead positions and with ferrous and non-ferrous metals. Tensile strength of welds, from 55,000 to 75,000 lb. per sq.in. with rods ranging from $\frac{1}{16}$ to $\frac{3}{8}$ in.

Welding Electrodes, "Thinweld"

Hobart Co., Troy, Ohio. (Vol.80,p.639.)

"Thinweld," specially coated electrodes for arc welding of light-gage sheet metal are offerred in $\frac{1}{16}$, $\frac{3}{32}$ and $\frac{1}{8}$ in. sizes. Applications of these electrodes are fabrication of sheets such as used in auto body and fender work and in heating and air-conditioning cabinets and ducts.

Welding Electrode, "Chromeweld 4-6"

Lincoln Electric Co., Cleveland, Ohio. (Vol.80,p.975.)

"Chromeweld 4-6" is a coated electrode for welding low-chromium steels. This electrode contains molybdenum and provides weld metal possessing the necessary high creep strength and other qualities essential for welding 4 to 6 per cent chromium steels. These electrodes are available in $\frac{1}{8}$, $\frac{5}{32}$ and $\frac{3}{16}$ in. diameter sizes.

Welding Flux, "Alumaweld"

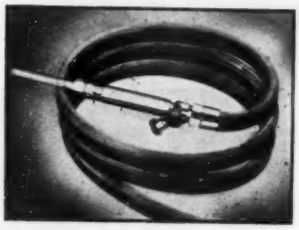
Alumaweld Co. of America, 2442 South Parkway, Chicago, Ill. (Vol.80,p.604.)

A flux to be used with "Alumaweld" solder has been placed on the market. With the solder and flux, cast or sheet aluminum can be soldered at low temperature. Sheet steel, brass, copper or other metals can be soldered to aluminum with Alumaweld and the bond will remain indefinitely as no electrolytic action is set up. The solder has a tensile strength of 12,000 lb. per sq. in. and the finished joint can be worked or machined. It takes a polish over which chromium or any other plating can be readily applied. Alumaweld solder and flux are applied with an ordinary soldering iron or with a blow torch.

Welding Hose, Duplex

Electric Hose & Rubber Co., Wilmington, Del. (Vol. 80,p. 676.)

"Supero Siameez" duplex welding hose is molded with a connecting web, so that a cross-section resembles the figure 8. The burst strength of the ¼-in.

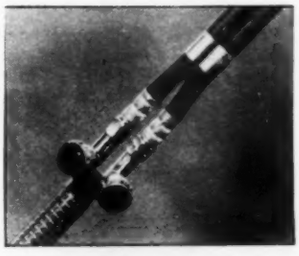


size is 2,000 lb. per sq.in. Construction permits the use of differing pressures in each side without torque or writhing. These hoses are available in red and black, red and green, or solid color.

Welding Hose, "Airco-Twin"

Air Reduction Sales Co., 60 E. 42nd St., New York. (Vol.80, p.1022.)

The "Airco-Twin" hose is available for oxyacetylene welding and cutting operations. Two lines of cord-reinforced hose are molded side by side into a single, flexible unit. For

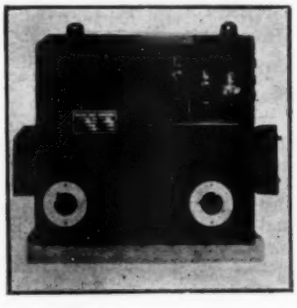


ready identification the acetylene line is colored red; the oxygen line green. This hose is available in lengths up to several hundred feet.

Welding Timer

Welding Timer Corp., 251 Ogden St., Newark, N. J. (Vol. 80,p.71.)

An electro-mechanical timer has been developed for spot welding machines. The device consists of an electronic timing

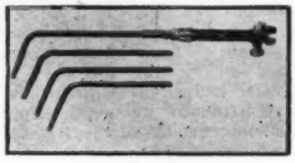


element and a set of balanced contactors designed to handle the high overload encountered in spot welding. Timing accuracy of less than one-quarter cycle, plus or minus, is guaranteed at one-cycle operation.

Welding Torch, Oxyacetylene

Modern Engineering Co., St. Louis, Mo. (Vol.80,p.567.)

The "Weldmaster" oxyacetylene welding torch weighs only 17½ oz. with standard tip, employs the circle mixer common to all "Mecco" torches. Even the largest tips may be used efficiently with low gas pressures as when working from acetylene generators.



Welding Torch, Electric

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. (Vol.80,p.815.)

An a. c. welding torch has been developed for use with 100-, 125- and 250-amp. a. c. welders. This welding torch is used much in the same manner as the acetylene torch. The

arc flame is the source of heat for fusing the parent and filler metals. Where filler metal is required, it is applied externally to the flame and puddled into the pool of molten metal.

With this torch, the high-frequency alternating current from the welder is utilized to form a smooth and stable welding flame.

Accessories and Attachments

Blade Holders, "Four-Grip"

Four Grip Tool Co., 107 E. 17th St., Paterson, N. J. (Vol. 80,p.564.)

Holders for thin cutting off blades which can be used instead of forged tools in which there is considerable waste, are now available. The blade is

held in the "Four-Grip" tool by socket setscrews and can be removed quickly for dressing and as quickly replaced.

Chucks, Pipe-Machine

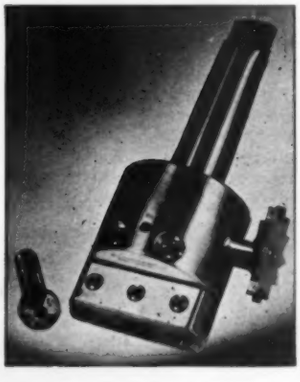
Landis Machine Co., Waynesboro, Pa. (Vol.80,p.565.)

A lever-operated front chuck and a rear-centering chuck are available for the 2-in. "Little Landis" pipe threading and cutting machine. These chucks can be supplied to take the place of the three-jaw universal front chuck, which is standard equipment.

Boring and Facing Head, Heavy-Duty

C. C. Craley Mfg. Co., P.O. Box 192, Shillington, Pa. (Vol. 80,p.390.)

A combination boring, turning and facing head, with a range from 0 to 20 in. has been developed. Four 1⅛-in. holes are provided for boring bars, three in the face and the fourth



directly through the block at a right angle. The dovetail tool block is 6 in. long, 2½ in. wide and ¾ in. high and has a 2½ in. travel, 1¼ in. right or left hand from center, for hand or power feed.

Brazer for Bandsaws

Grob Bros., Grafton, Wis. (Vol.80,p.837.)

This electric brazer to join the ends of metal-cutting bandsaws has extensions through the top of the cover for clamp-

ing and alignment of the saw-band ends. A center clamp presses the ends together. Capacity, ½ in. wide saws.

Chucks, Collet

Universal Engineering Co., Frankenmuth, Mich. (Vol.80, p.526.)

The Type "WW" takes shanks from ⅛ to ⅜ in. and Type "ZZ" takes shanks from ½ to 1 in. They have been es-

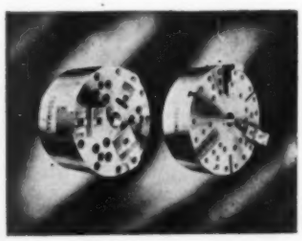
pecially designed to hold end mills, keyway cutters, drills and other tools of this character.

Chucks, Self-Centering

Cushman Chuck Co., 806 Windsor St., Hartford, Conn. (Vol.80,p.939.)

This line of self-centering chucks has a lever-actuated jaw movement. The No. 700-A chuck, left, is a medium-duty, two- or three-jaw design. Jaws are tongue-and-groove type.

The No. 800-A heavy-duty chuck, right, has three jaws of

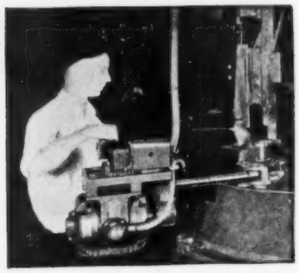


the serrated type and has the same features as the No. 700-A chuck. Primarily designed for use with Cushmatic electric power units, these chucks are equally adaptable for use with hydraulic or pneumatic units.

Chuck Wrench, Power

Cushman Chuck Co., 806 Windsor St., Hartford, Conn. (Vol.80,p.939.)

This electrically operated power chuck wrench is driven by a high-torque, constant-speed reversible motor through a reducing gear and splined sleeve. It is suited for application to multiple-spindle chucking machines, drill presses, and

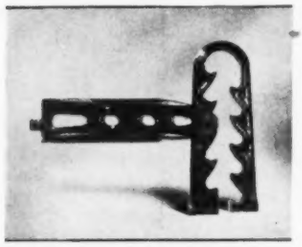


for rotating indexing tables. Motive power can be applied by means of a hand- or treadle-operated switch. The standard unit will apply approximately 300 lb.-ft. torque.

Clamping Blocks and Straps

Robert W. Lord, Box 292, Portsmouth, N. H. (Vol.80, p.940.)

This clamping device for holding parts set-up for layout or machining operations consists of a block having steps of varying height, to support one end of the strap mating with

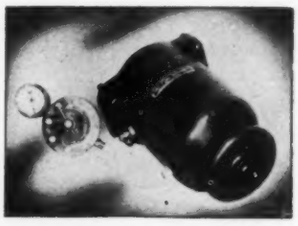


the block. Both the blocks and the straps are available in 6-, 12-, 18- and 24-in. sizes. Any length strap can be used with any height block. Clamping bolts up to 1¼ in. diameter may be used.

Die Cushion, Pneumatic

Dayton Rogers Mfg. Co., 1835 E. Franklin Ave., Minneapolis, Minn. (Vol.80,p.1094.)

Each of these improved combination drawing and stripping die cushions is a self-contained unit. Provision is made for a pneumatic hose connection from the regulating valve with a pressure gage to record the amount of air pressure used on each job. Five sizes are available with piston diameters ranging from 4 to 12 in., and working pressure from ¼ to 5 tons on an air line pressure

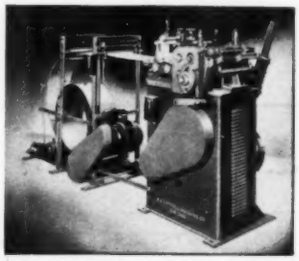


from 20 to 150 lb. Maximum drawing capacity is 1½ in. for all sizes.

Feed, Punch-Press, Automatic

F. J. Littell Machine Co., 4127 Ravenswood Ave., Chicago, Ill. (Vol.80,p.973.)

This is a motor-driven, intermittent feeding unit for delivering coiled stock to double-action presses. The feeding unit is equipped with a five- or

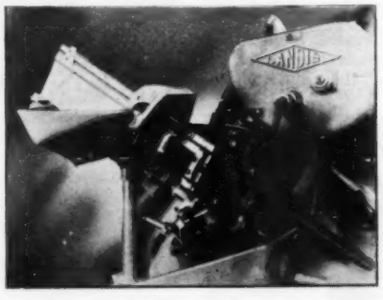


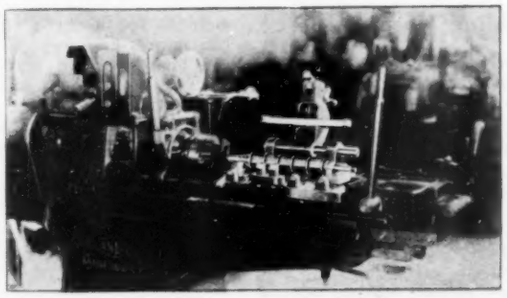
seven-roll straightener, which is not usually power driven. A power-driven stock reel is used so that the feeding unit always feeds from a loop of material. The reel is fitted with an automatic shut-off to prevent the loop from becoming too large. The reel used can be either of the cradle or the automatic centering type, depending on the weight of coils to be used.

Feed for Threading Machine

Landis Machine Co., Waynesboro, Pa. (Vol.80,p.252.)

This magazine feed increases the capacity of Landis automatic forming and threading machine. This magazine will take bolts up to 7¼ in. long. The capacity range of the machine is up to 2½ in. length of thread on ⅜ or ¾ or 1 in. diameter bolts from 2½ to 7¼ in. long.; and with head thickness up to 1¼ in.





Fixture, Work-Holding, Threading Machine

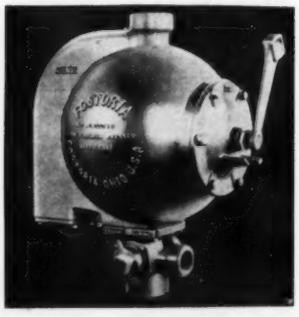
Landis Machine Co., Waynesboro, Pa. (Vol.80,p.283.)

This work-holding fixture for threading machines is designed to maintain concentricity between both ends of a threaded part. A ⅜-in. hardened and ground "Lanco" head is used for cutting the threads. The shaft is held in V-grips made of hardened steel and gripped on the bearing surfaces at each end.

Filter, Coolant, No. 12

Fostoria Pressed Steel Corp., Fostoria, Ohio. (Vol.80,p.566.)

The No. 12 model coolant filter has a capacity twice that

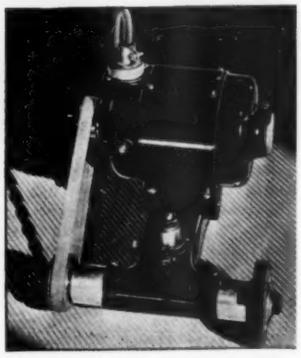


of the No. 3. It is designed primarily for the larger grinders. The filtering bowl is approximately 13 in. in diameter.

Grinder, Lathe "Toolmaker," No. 44

Dumore Co., Racine, Wis. (Vol.80,p.284.)

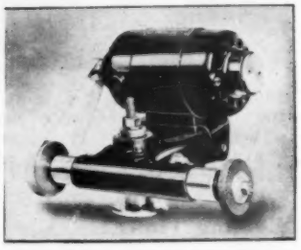
Equipped with a motor that develops ¼ hp., the No. 44 "Toolmaker" provides a spindle speed from 7,000 to 44,000 r.p.m. for internal and external work. Spindle is mounted in ball bearings. The "Toolmaker" can be used on lathes with as little as 8-in. swing.



Grinder, Lathe, No. 11 "Speedee"

Dumore Co., Racine, Wis. (Vol.80,p.708.)

The No. 11 "Spee-Dee" lathe grinder will swing a 2 in. straight wheel for external grinding and will grind internal holes ½ in. in diameter and larger to a depth of 2½ in. With a ⅛-in. collet-type chuck

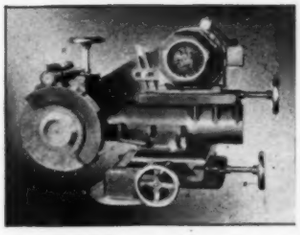


it will grind smaller diameters 1 in. deep. The spindle operates at 6,000 r.p.m. for external work and 30,000 r.p.m. for internal work. The unit weighs 10 lb.

Grinder, Thread, Portable

Hisey-Wolf Machine Co., Cincinnati, Ohio. (Vol.80,p.69.)

This motor-driven, worm-thread grinder is available for grinding operations on lathes. It has height and angular adjustments, both for the spindle and the entire unit, and the wheel can be mounted on either end of the spindle. A universal

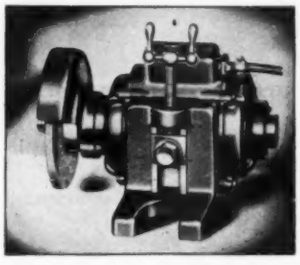


wheel dressing attachment is available for retruing bevel and straight-face wheels when mounted on either end of the spindle. Three sizes are available, with 1, 3 and 5-hp. motors.

Grinding Attachment, Angle-Plate

Hisey-Wolf Machine Co., Cincinnati, Ohio. (Vol.80,p.1090.)

"Hisey" motor-driven angle-plate grinders are designed to be attached to the toolpost of a lathe, the vise of a milling machine or the head of a planer or boring mill. They are avail-



able in six sizes, ranging from ¼ to 5 hp. capacity. Double lock nuts are used on the spindle, permitting operation of the wheel in either direction.

Wheel Dresser, Diamond

Dumore Co., Racine, Wis. (Vol.80,p.745.)

Wheels used on Dumore lathe grinders can be quickly trued with the No. 10 grinding wheel dresser. The dresser is clamped to a plug held in the faceplate and the grinder swung so that the wheel will contact the diamond of the dresser. The sides of the wheel as well as the face can be dressed.

Lamp, Machine, No. 16

Fostoria Pressed Steel Corp., Fostoria, Ohio. (Vol.80,p.531.)

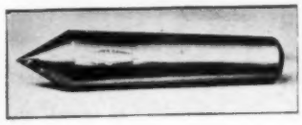
The No. 16 machine lamp was designed for use on any machine where a small localized

lighting unit is desirable. It is fitted with ball and socket joints for maximum flexibility and will withstand the shocks and vibration.

Lathe Centers

Tungsten Carbide Tool Co., Detroit, Mich. (Vol.80,p.31.)

Tungsten-carbide tipped lathe centers are now available from stock. For roughing the new centers permit much heavier

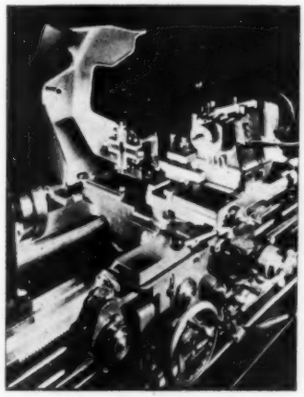


cuts than with conventional types, since the side thrusts can be taken without excessive wear.

Lathe Turret, Necking, Chamfering and Forming

Monarch Machine Tool Co., Sidney, Ohio. (Vol.80,p.281.)

This rear necking, chamfering and forming turret is available for mounting on the back of a connected compound rest on an 18 in. Model "BB" shaft turning lathe. To reduce the time on shaft work, the rear turret



is operated from the front of the lathe. Turrets are arranged for either four or six tools. When set up for four tools, the turrets accommodate a ¾ in. square tool, and when arranged for six tools a ⅝ in. square tool is accommodated. This turret has been designed to reduce work time and to avoid second operations.

Milling Head, High-Speed, Universal

Cincinnati Milling Machine and Cincinnati Grinders, Inc., Marburg & South St., Cincinnati, Ohio. (Vol.80,p.1023.)

Made in sizes to fit Cincinnati L-type, MH and dial-type milling machines, this high-speed universal milling head is available for toolroom and light production work. It is suitable for use with small milling cutters, drills, or boring tolls.

The attachment is driven directly from the machine spindle

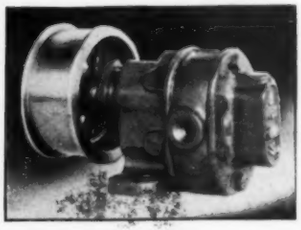
by means of a splined shaft fitting into an adapter. The overarm of the milling machine constitutes the supporting element Graduations allow accurate setting of the cutter to any desired angle.

The attachment spindle has a No. 40 National Standard taper. A No. 9 B. & S. taper is used in the quill. Quill feed adjustment is 2¼ in. Distance from the face of the machine column to the center of the attachment spindle is adjustable from 11⅛ in. minimum to 18⅛ in. maximum.

Pump, Coolant

Brown & Sharpe Mfg. Co., Providence, R. I. (Vol.80,p.34.)

Three rotary gear pumps with helical gears are available. Known as Nos. 1S, 2S and 3S, they permit direct drive at ordinary motor speeds. They are intended primarily for use



with comparatively clean liquids such as clean oil, oil emulsion, and soda solution. Pumps will raise oil on suction side for a distance of 25 to 35 ft. at speeds above 1,000 r.p.m.

Pump, Coolant, "Sure-Flow"

Acme Machine Products Co., Muncie, Ind. (Vol.80,p.179.)

Requests for a small, direct-motor driven centrifugal pump made during the Machine Tool Show, resulted in the develop-

ment of this 4-g.p.m. pump for coolants for lathes and other machines. The pump is available for both high- and low-pressure service.

Quick Return Mechanism, Milling-Machine Table

Porter-Cable Machine Co., Syracuse, N. Y. (Vol.80,p. 1019.)

The "Electric Quick Return" attachment, for use on production milling machines on which no quick-return feature has been incorporated, is easily mounted by means of special brackets. It is not applicable to rack-type milling machines.

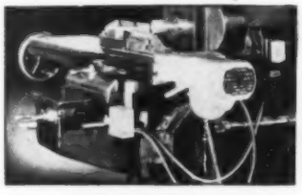
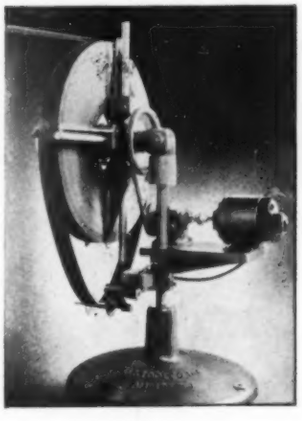


Table can still be manually traversed by hand crank at opposite end. The ½-hp. motor is of a special reversible type. Drive is through a 2½ to 1 gear reduction, giving a table travel of approximately 30 ft. per min.

Reel, Strip-Stock

U. S. Tool Co., Ampere, N. J. (Vol.80,p.251.)

A motor-driven automatic stock reel has been developed for handling heavy reels of



strip. The proper loop of stock is maintained by a mercury switch, which operates the motor. Two vertical types and a horizontal model are available. Capacities range from coils weighing 250 to 600 lb. Inclinable models may be had.

Shaper Table, Universal

Bryant Machine & Engineering Co., 400 West Madison St., Chicago, Ill. (Vol.80,p.393.)

This improved universal table for Ohio shapers is made in sizes from 16 to 36 in., will revolve 360 deg. on a trunnion and the tilting top is adjustable 15

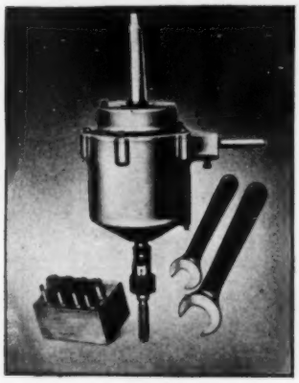
deg. either way from horizontal on an axis at right angles to the trunnion. The unit is further equipped with a solid top located 90 deg. from the tilting top.

Tapping Attachment and Tap Holder

Procunier Safety Chuck Co., 18 S. Clinton St., Chicago, Ill. (Vol.80,p.563andp.900.)

Two high-speed precision friction tapping attachments fitted with the "Tru-Grip" tap holder have been announced. The small size of the tap holder permits precision tapping close to a shoulder and provides for clear vision without stooping or sitting. The tap is driven by the square which fits into a milled slot in the spring collet. A separate spring collet is used for each size of tap shank.

The smaller tapping attachment has a capacity from No. 2

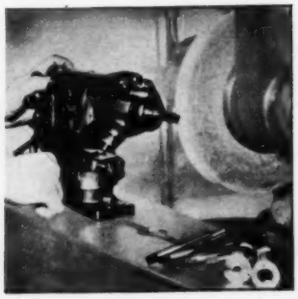


to $\frac{5}{16}$ in. in steel, or $\frac{1}{4}$ in. in brass and cast iron. The Model E2 attachment has capacity for No. 7 to $\frac{1}{2}$ in. taps.

Tap-Chamfering Fixture

Detroit Tap & Tool Co., Detroit, Mich. (Vol.80,p.897.)

This tap-chamfering fixture, for sharpening any size and type of tap up to and including $1\frac{1}{4}$-in. diameter, irrespective of number of flutes or shank length, is now available. Taps are held



and located in spring collets. This fixture can be mounted on any type of grinding machine in either a right- or left-hand position.

Tapping-Machine Control

R. G. Haskins Co., 4630 W. Fulton St., Chicago, Ill. (Vol. 80,p.1060.)

This air-control increases the sensitivity and accuracy of Haskins tappers and reduces operator fatigue. Speed of feeding and reversing the tap is controlled and a uniform pres-

sure is maintained. The control unit consists of an air cylinder which operates the feed by means of a plunger connected to the treadle. Control is effected by a foot-operated valve which is connected to the air supply. Applied pressure is regulated at the treadle.

Tapping Attachment, High-Speed

Ettco Tool Co., 594 Johnson Ave., Brooklyn, N. Y. (Vol.80, p.820.)

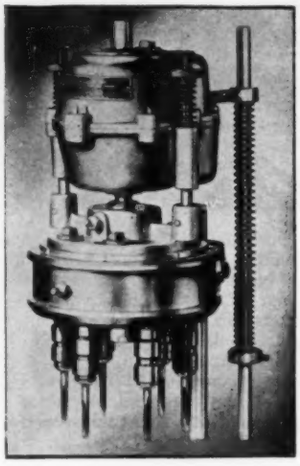
The "Ettco-Emrick" high-speed tapping attachment has a sensitive friction clutch drive which is regulated by pressure on the lever of the drilling

machine. If the tap sticks or "bottoms," the clutch will slip. This attachment is made in two sizes for taps from $\frac{1}{4}$ to $\frac{1}{2}$ in. diameter.

Tapping Head, Multi-Spindle

Ettco Tool Co., 594 Johnson Ave., Brooklyn, N. Y. (Vol.80, p.818.)

"Ettco-Emrich" multiple-spindle tapping heads can be made to order from stock parts. With this system, a stock case is bored to suit specifications and the stock gears and other parts are assembled within the case. The shortest center-to-center distance of the spindles for which stock gears are available is $\frac{3}{4}$ in. and the shortest possible center distance is $\frac{5}{8}$ in., any spacing under $\frac{3}{4}$ in. being furnished to order. The standard faceplate driving unit is made in four sizes.



Thread Chasing Attachment, Turret Lathe

Gisholt Machine Co., Madison, Wis. (Vol.80,p.748.)

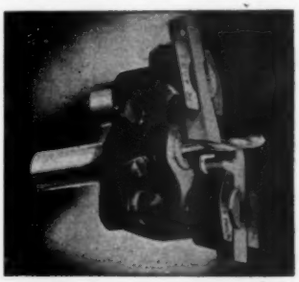
This thread chasing attachment has been developed for the Nos. 3, 4 and 5 ram-type universal turret lathes and is designed for cutting with either dieheads or taps. The turret threading attachment leads the die onto the work at a uniform

rate governed by a section of leadscrew. This results in the thread being free from drag of the turret and ram. Threading capacity is from 4 to 32 threads. A gearbox makes possible three ranges of feed, 24 in all, ranging from 0.001 to 0.104 in.

Tool Holder, Turning, Combination

R & L Tools, Nicetown, Philadelphia, Pa. (Vol.80,p. 1092.)

This R & L combination turning tool is designed for use with No. 00 Brown & Sharpe automatic screw machines. It will turn up to $\frac{1}{4}$ in. diameter by $1\frac{1}{4}$ in. long and may be used for either right or left turning. This tool can also be used



as a balanced tool with two cutters for roughing, for turning two or more diameters simultaneously, or as a combination tool for drilling or centering one or more diameters in a single operation.

Turning Attachment, Radius

Wade Tool Co., Waltham, Mass. (Vol.80,p.640.)

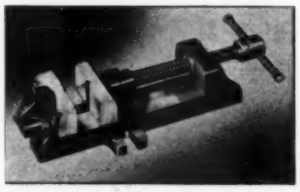
This radius turning attachment for bench lathes has been designed to machine spherical surfaces, either concave or convex, on the axis of the lathe. It can also be used to machine half-round grooves (concave), or half-round collars (convex) on the surface of a cylinder rotated on the axis of the

lathe. Two interchangeable toolholders and a set block are furnished. The tool is for use with lathes having swings from 8 to 8½ in., and its capacity is from 0 to 4 in. diameter.

Vise, Machine, "Simplex"

Desmond-Stephan Mfg. Co., Urbana, Ohio. (Vol.80,p.217.)

This "Simplex" light-weight vise for use with drill presses and milling machines has a jaw width of 3½ in. and a jaw opening of 4½ in. A V-slot is cut



in the movable jaw for holding round pieces. The top, sides and faces of the jaws are accurately machined, as are the top and bottom of the base. Weight, 15 lb.

Vise, Machine, Universal

Covel Mfg. Co., Benton Harbor, Mich. (Vol.80,p.220.)

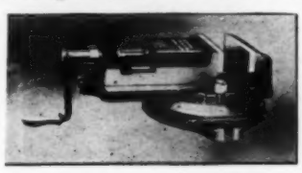
This 4-in. universal vise for surface grinders, milling machines, shapers or drill presses will accurately produce predetermined angles and clearances

in both directions. All surfaces are ground to squareness and are graduated in degrees. Jaws are 4½ in. wide and 1½ in. high. The base dimensions are 4½x8 in. Weight, 36 lb.

Vise, Milling Machine

Athol Machine & Foundry Co., Athol, Mass. (Vol.80,p. 675.)

When used with the indexing base, this vise is suitable for milling-machine use and for

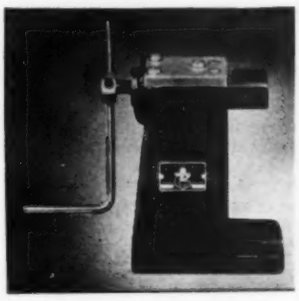


other operations requiring accurate angle settings. When removed from the swivel base, the vise is suitable for drill press use and similar operations. The vise is available in two sizes, with 4- or 6-in. jaws.

Vise Fixture, No. 602

R. G. Haskins Co., 4630 W. Fulton St., Chicago, Ill. (Vol. 80,p.603.)

For accuracy in high-speed tapping and drilling, as well as such operations as countersinking and counterboring, the No. 602 vise fixture has been developed. The three-point con-



tact jaws are made of hardened tool steel. Five combinations of jaws, handling round stock from ⅛ to 1 in. in diameter, are available.

Blueprinting and Drafting Equipment

Blueprint Machine, Model 7

C. F. Pease Co., 813 N. Franklin St., Chicago, Ill. (Vol. 80,p.217.)

The Model 7 was developed for continuous printing of moderate requirements, and for auxiliary equipment to be used with machines of larger capacities. It is well adapted for

handling rush jobs. The speed range is from 4 to 60 in. per min. The machine is 54 in. high, 61 in. wide, 32 in. deep, and takes 32 in. x 61 in. floor space.

Blueprint Machine, Continuous

Ozalid Corp., 354 Fourth Ave., New York, N. Y. (Vol.80,p. 566.)

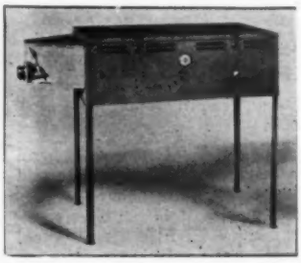
Specially developed to reproduce tracings to blue prints, "Ozalid" prints of varied colors and other direct process prints and transparencies the Wickes Simplex electric unit will print

continuous rolls up to 44 in. wide and of unlimited length, or separately cut sheets either singly or in multiples. Variable friction feed gives a printing feed from 24 in. down to a minimum speed satisfactory for making Van Dykes and other slow printing emulsions.

Blueprint Machine

Milligan & Wright Co., 1209 W. Third St., Cleveland, Ohio. (Vol.80,p.675.)

A model double the size of previous machines has been added to the line of Angstrom-lamp blueprinters. Essential features of the older model are

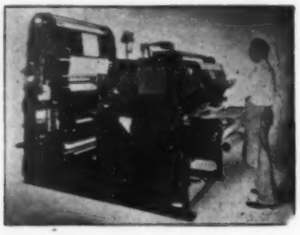


retained. The new unit is 24 x 36 in. Forced ventilation prevents any tendency to overheat. Prints cost about 1.3 cents per sq.ft. Incandescent lamps are used as light source.

Blueprinters, Continuous

C. F. Pease Co., 813-821 N. Franklin St., Chicago, Ill. (Vol. 80,p.1058.)

The Model "27" and Model "27-D" continuous blue-printing machines will produce blue prints, negatives, blue-lined or brown-lined prints at a production speed up to 14 ft. per min. The blue-printing machine is available as a separate unit or in combination with either a radiator or a double-drum type



washing, developing and drying unit. Either combination is available in two sizes to accommodate all widths of sensitized paper or cloth up to either 42- or 54-in. wide.

Copying Unit, Drawings

Electro Copyst, Inc., 243 Madison Ave., New York, N. Y. (Vol.80,p.283.)

The "Electro-Copyst" reproduces facsimile copies from transparent or opaque subjects. The apparatus is portable, is simple in design and may be

had in several sizes. It may be operated in daylight. The standard model copies work up to 15½x10 in.

Curve, Adjustable, Lead-Core

Wade Instrument Co., 2274 Brooklyn Station, Cleveland, Ohio. (Vol.80,p.1019.)

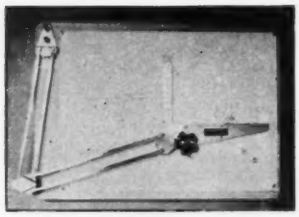
For drafting-room use, this rubber, adjustable curve has a lead-core held between two spring steel strips. All parts of the core are free, eliminat-

ing stiffness and resulting in natural curves. The top and bottom of the curve are wide and corrugated, giving room to rest the fingers and facilitating holding it in place.

Drafting Machine, Model E-272

L. G. Wright, Inc., 5714 Euclid Ave., Cleveland, Ohio. (Vol.80,p.253.)

The "Wrigraph" Professional Model E-272 is mounted on a 22x30 in. cleated, white



pine board. The parallel mechanism is equipped with a vernier protractor reading in degrees. The protractor has a chuck plate to hold drawing attachments in alignment.

Drafting Stand, Adjustable, "Wrigraph"

L. K. Wright, Inc., 5714 Euclid Ave., Cleveland, Ohio. (Vol.80,p.1019.)

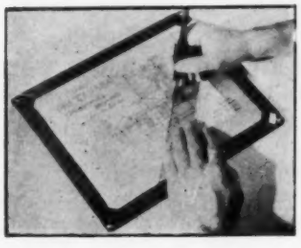
This adjustable "Wrigraph" drafting stand is suitable for drawings under 20x36 in. Used in connection with a Wrigraph drafting machine, this table will

serve as a complete drafting unit. The drawing board tilts 90 deg. and can be securely clamped at any angle. Height is adjustable from 33 to 45 in.

Drawing Board, Molded

H. E. Twomley, 7154 Magnolia Ave., Riverside, Calif. (Vol.80,p.176.)

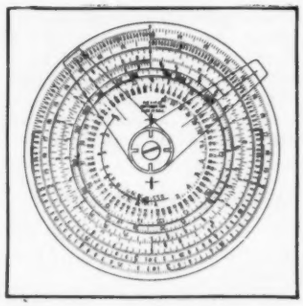
This compact drawing board for shop work is made of molded material, and is fitted with spring clamps at the corners to hold the paper. No T-square is required. A 45-deg. triangle is all that is needed for horizontal, perpendicular and diagonal lines.



Slide Rule, Apex

Gilson Slide Rule Co., Stuart, Fla. (Vol.80,p.558.)

This circular calculator is 8¼ in. in diameter and has a C scale of 25 in. Known as the "Apex Slide Rule" it will solve any problem that can be done on the regular type of slide rule, and has a number of special scales not found on other instruments. There are eleven scales in all.

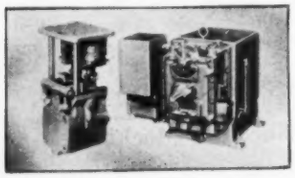


Hydraulic Equipment

Control, Hydraulic-Feed

Oilgear Co., 1301 W. Bruce St., Milwukee, Wis. (Vol.80, p.566.)

Hydraulic and electrical devices are combined in this controller developed for machine tool feeds. At the left of the illustration is shown a remote controller unit with the cover removed while at the right is

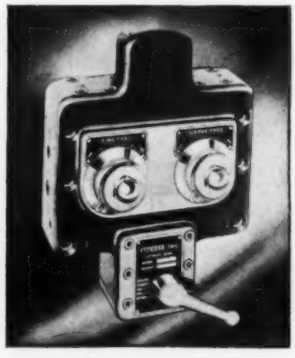


a fluid power feed pump with the remote controller flange-mounted on the left-hand side. A remote control for the fine-feed pilot valve also can be had for mounting on the side of the pump.

Control Panel, Hydraulic-Feed

Vickers, Inc., 1400 Oakman Blvd., Detroit, Mich. (Vol.80, p.901.)

This hydraulic feed control unit is compact and flexible and provides smooth, accurate feeds for machine tools. The Vickers Series C2-1237 feed control panel has only two moving parts and these are constantly lubricated. Adjustments of each of the feed rates are infinitely variable within a specified range.



Control Panel, Hydraulic-Feed

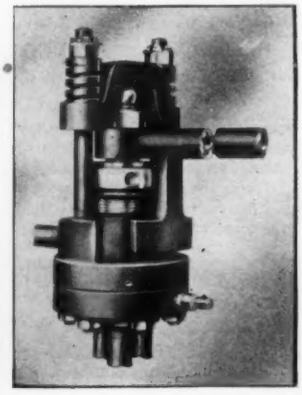
Sundstrand Machine Tool Co., Rockford, Ill. (Vol.80, p.33.)

This hydraulic control valve and circuit is available to provide control of machine tool feeds. The control valve, or panel, provides rapid approach, feed, adjustable dwell and rapid return. Sequence is controlled by adjustable dogs.

Valves, Hydraulic

W. H. Nicholson & Co., Wilkes-Barre, Pa. (Vol.80, p.528.)

Style "H" Nicholson hydraulic valves, for oil or water service up to 5,000 lb. pressure, are furnished in 2, 3 and 4 way types. The valve is hydraulically balanced, permitting the disk to work easily upon its seat, and to hold tight. Furnished in cast steel or bronze bodies with a monel stem.



Pump, Hydraulic

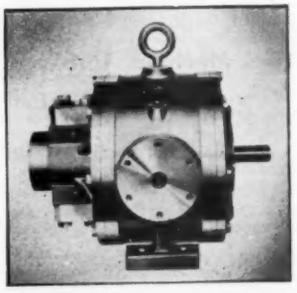
Sundstrand Machine Tool Co., Rockford, Ill. (Vol.80, p.33.)

This hydraulic unit consists of two pumps, one a variable-displacement pump giving two adjustable feeds and the other a constant-displacement pump that provides rapid traverse. Both pumps are incorporated in a single housing and are driven by a single shaft. Two pre-set rates of feed are provided, both of which are adjustable.

Pump, Hydraulic, Radial

Hydraulic Press Mfg. Co., Mt. Gilead, Ohio. (Vol.80, p.708.)

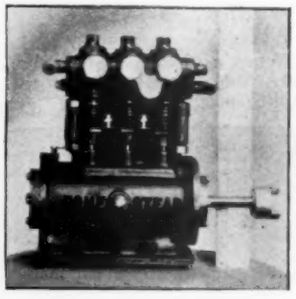
An improved mechanical relationship between the valve pintle and the cylinder rotor is employed in the Model 4R "H-P-M" radial pump. Positive positioning of these vital parts is thus assured.



Pump Plunger, High Pressure

Homestead Valve Mfg. Co., Coraopolis, Pa. (Vol.80,p.176.)

Depending upon the speed of the pump, the capacity may be varied from 15 to 120 g.p.h. A ¾-hp. motor will operate the pump at 60 g.p.h. and 200 lb. pressure. It is a single-acting plunger type having three cylinders of ¾ in. bore and ⅝ in. stroke. Pressures may range as high as 500 lb. per sq.in.

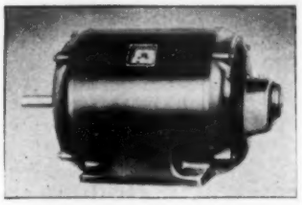


Electrical Equipment

Motor, A.C., Type S R

Emerson Electric Mfg. Co., 2088 Washington Ave., St. Louis, Mo. (Vol.80,p.215.)

Type SR single-phase motors embody a smooth torque-speed curve, the efficient starting features of the repulsion motor, and the approximately constant-speed load operation of the induction motor.



Motor, D.C., Inclosed

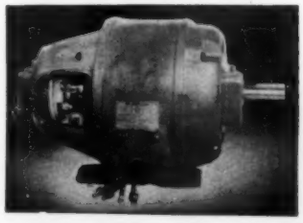
Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa. (Vol.80,p.215.)

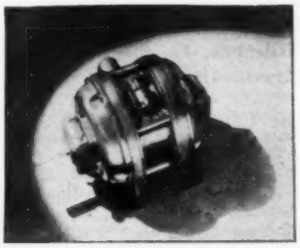
A fan-cooled, totally inclosed d.c. motor with unusual accessibility to the armature has been developed. It has an external fan and shroud on the commutator end. This design prevents the blower from sucking lubricating oil.

Motor, Induction

Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa. (Vol.80,p.634.)

Especially designed for heavy industrial duty, the Type CR single-phase, repulsion-start induction motor has high starting and pull-in torques. It is available in ratings from ¾ to 3 hp., 110/220 volts, and comes up to speed in a very short period of time.





Motors, Polyphase

General Electric Co., Schenectady, N. Y. (Vol.80,p.902.)

Redesigned riveted-frame, squirrel-cage polyphase induction motors, in frame-sizes from 1 to 15 hp. at 1,800 r.p.m. have been placed on the market. These motors, available in a variety of electrical and mechanical modifications, incorporate improvements in stator-coil insulation, frame construction and other features.

Motors, Explosion-Tested

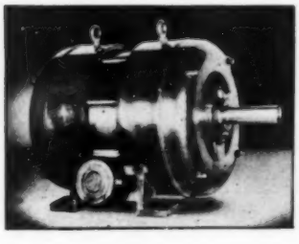
Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa. (Vol.80,p.1022.)

An improved design of Type SK, explosion-tested, fan-cooled, totally-enclosed d.c. motors is available in sizes ranging from 5 to 75 hp. in 115-, 230- and 550-volt capacities. They are designed for use in locations where explosive gases or dust conditions exist.

Motors, Inclosed

Cleveland Electric Motor Co., 5213 Chester Ave., Cleveland, Ohio. (Vol.80,p.1023.)

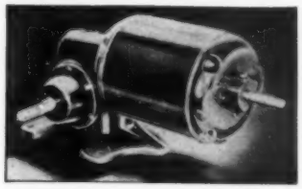
This concern will furnish inclosed, fan-cooled a.c. motors in ratings from 1 to 60 hp. These motors are available in standard frames and in practically all N.E.M.A. frames.



Gear Motors, Slow Speed

Wagner Electric Corp., 6400 Plymouth Ave., St. Louis, Mo. (Vol.80,p.217.)

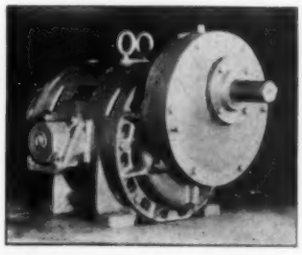
These fractional-horsepower gear motors can be supplied to deliver power at any required speed. They are available in single-reduction and double-reduction types with right-angle-shaft drive; and in single-, double- or triple-reduction types with parallel-shaft drive. Output speed can be as low as 6 r.p.m.



Gear Motors

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. (Vol.80,p.900.)

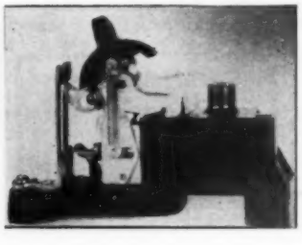
Single reduction, explosion-proof gear motors, ranging from 1½ to 75 hp., are available for application in hazardous locations. The gears are of the single helical type and are heat-treated to provide load-carrying capacity for the maximum torque the motor will develop.



Circuit Breaker

General Electric Co., Schenectady, N. Y. (Vol.80,p.215.)

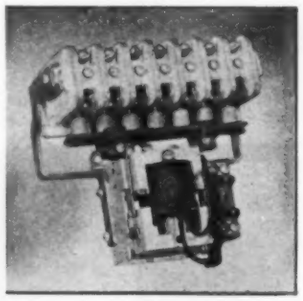
Type AF-1 air circuit breakers have been redesigned to provide a mid-position of the handle to indicate automatic tripping. This design is available for 230-volt a.c., 125-250-volt d.c., 50-amp. use.



Contactor, Magnetic

General Electric Co., Schenectady, N. Y. (Vol.80,p.180.)

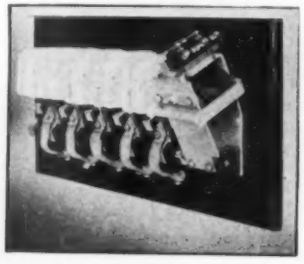
Intended for use either with small single-phase and polyphase a.c. motors, or as a flexible relaying device for complicated control systems, such as are used in machine tools, the Size 0 multiple magnetic contactor is available with either normally open or closed contacts.



Contactor, Low-Voltage

General Electric Co., Schenectady, N. Y. (Vol.80,p.217.)

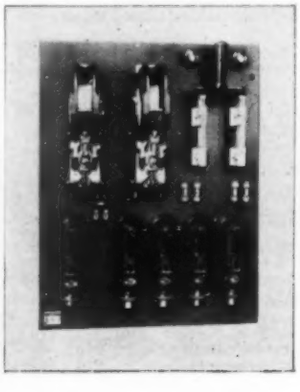
This low-voltage a.c. contactor will stay closed under voltage disturbances or failure. The contactor is closed by a d.c. magnet, energized through a copper-oxide rectifier. A reversal of the coil-exciting current with a push button momentarily opens the contactor.



Panels, Crane Control

Electric Controller & Mfg. Co., 2721 E. 79th St., Cleveland, Ohio. (Vol.80,p.640.)

A complete line of control panels is available to protect electrical equipment used on

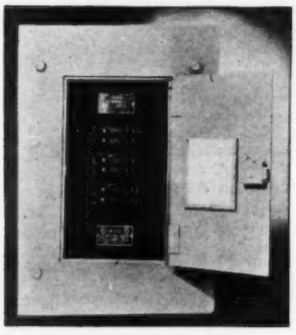


cranes. These are used in place of circuit breakers, knife switches and fuses. All of the necessary protective devices are incorporated into a single, compact unit, requiring a minimum amount of space.

Panelboard, "Nofuze"

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. (Vol.80,p.1094.)

The "Nofuze" panelboard is designed for general 115, 115/230 volt a.c. distribution with branch circuits ranging

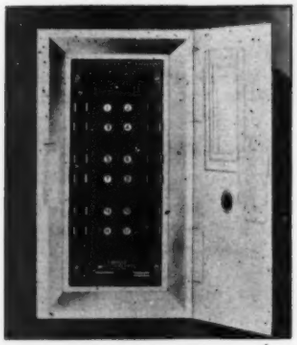


from 15 to 50 amp. capacity. This panelboard uses multi-breaker units. Units are available with 4 to 40 circuits in 2 circuit steps.

Panelboard, "Multi-breakeR"

Square D Co., 710 S. Third St., Detroit, Mich. (Vol.80,p. 1092.)

"Multi - BreakeR" lighting panelboards are of compact design and small size. The boxes are 15-in. wide and 4-in. deep. They can be mounted in locations not previously suit-



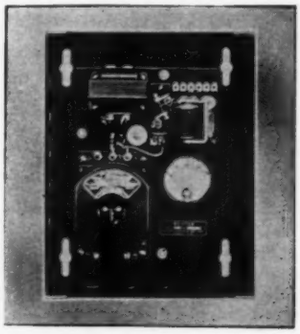
able for panelboards. Wiring gutters are 4-in. wide.

These panelboards are supplied with from four to 40 circuits in two circuit groupings for 115, 115/230 volt a.c.

Photo-Electric Unit, Model 729

Weston Electrical Instrument Co., Newark, N. J. (Vol.80, p.639.)

The assembly consists of a Weston photo-cell of high output characteristic in a pro-

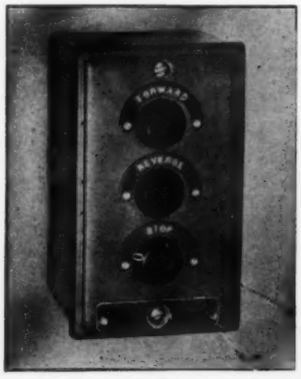


tective mounting, a complete relay unit in a separate panel box, and a light source of standard design. Output capacity is 500 watts, so that most installations can be handled directly by the relay contacts without the use of external contactors.

Pushbutton Stations

Arrow-Hart & Hegeman Electric Co., Hartford, Conn. (Vol.80,p.565.)

Interchangeable control units that can be assembled in any combination for regular or special applications are available. The pushbutton stations are made in one-button, two-button and three-button

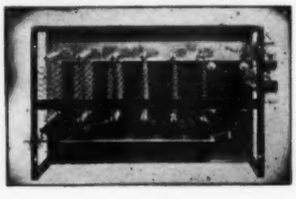


styles and may be combined with Neon pilot lights and transfer switches in two or three positions, such as "automatic-hand" or "automatic-off-hand."

Rheostat, Plating, Sealed Switch

Crown Rheostat & Supply Co., 1910 Maypole Ave., Chicago, Ill. (Vol.80,p.1094.)

Crown electroplating rheostats now have totally inclosed switches. All contacts of these switches are inside sealed



tubes, protected from fumes and corrosion. Automatic adjustment is provided to compensate for contact wear. These rheostats are made in sizes from 15 to 5,000 amp. and in several types.

Starters, Across-the-Line

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. (Vol.80,p.600.)

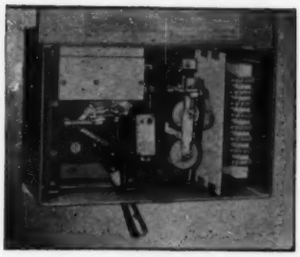
This complete line of line-starters, employing the "Deion" principle of arc interruption, was designed for across-

the-line starting of single-phase and polyphase, squirrel-cage induction motors and as primary switches for wound-rotor motors.

Starter, D.C., Automatic

Ohio Brass Co., Mansfield, Ohio. (Vol.80,p.601.)

The Type DRT automatic d.c. motor starter has been redesigned to provide increased simplicity and more clearance between parts. This starter,



one of five models, is intended for automatically starting and protecting shunt- or compound-wound d.c. motors on various types of machinery.

Starter, Motor, A.C., Type T

Square D Co., 710 S. Third St., Milwaukee, Wis. (Vol.80, p.940.)

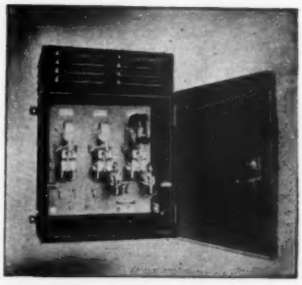
This a.c. automatic line-voltage-type starter for polyphase motors is designed for remote operation of 7½ to 25 hp. motors. The starter is known as Type T, Class 8536.

The four major features are: accessibility for inspection, arrangement of parts for quick replacement, vertical closing section and compactness.

Starter, D.C., Mill-Type

Electric Controller & Mfg. Co., 2721 E. 79th St., Cleveland, Ohio. (Vol.80,p.976.)

The "RD" mill-type starter provides a universal, compact and standardized unit suitable for use with a wide range of motor sizes. These starters employ mercury acceleration relays which permit a time

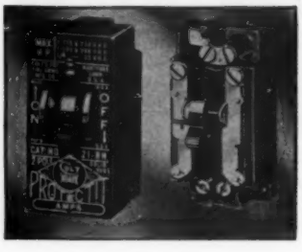


range of ½ to 2 sec. per step. By changing the manner in which the resistors are connected, these starters can be used with any 230-volt d.c. motor within the range of 5 to 25 hp.

Switch and Circuit Breaker, "Protectit"

Colt's Patent Fire Arms Mfg. Co., Hartford, Conn. (Vol.80, p.175.)

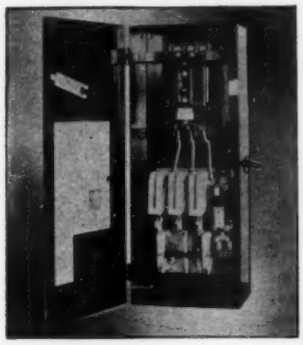
The 250-volt Colt-Noark "Protectits" are control switches with automatic current overload protection. They are adaptable for mounting on the cover plate of an outlet, box or wall. The standard casing is 3½ in. long, 1½ in. wide and 1¼ in. deep.



Switch, Magnetic, Combination

General Electric Co., Schenectady, N. Y. (Vol.80,p.179.)

A line of combination magnetic switches with maximum ratings of 25 hp. at 220 volts, and 50 hp. at 440 to 600 volts,

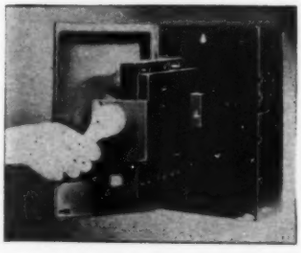


has been introduced. Air circuit breakers, which can be reset by hand after tripping are used instead of fused switches.

Switches, Industrial

Square D Co., 710 S. Third St., Detroit, Mich. (Vol.80, p.530.)

The swing-out interior feature has been incorporated in the Type "C" and general purpose 30- and 60-amp. switches. This feature permits the en-



tire base and operating mechanism to be swung out and away from the box, giving the entire box area for bringing in conduit and wires.

Switch, "Micro"

C. S. Burgess Laboratories, Inc., Freeport, Ill. (Vol.80, p.1056.)

Improvement in the "Micro Switch" automatically limits overtravel. Two methods of actuation are available. One is a leaf-spring operating lever which permits greater movement of the actuating force than is provided by the standard plunger. The second actuating device is a sleeve which

fits over the standard operating plunger and actuates the switch through a spring in the cap.

Switches, Inclosed

Ward Leonard Electric Co., Mount Vernon, N. Y. (Vol. 80,p.903.)

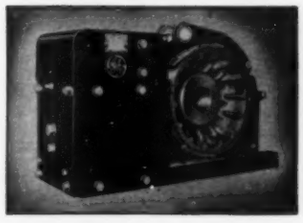
The Type A motor-disconnect switches have double-break heavy contacts equipped with fiber arc snuffers. Switch No. 2701-208 is illustrated. These switches have ample capacity

for frequent use and heavy overloads. They are available with two, three or four poles and from 30- to 200-amp. capacity for use with either alternating or direct current.

Brake, Magnetic, Three-Shoe

General Electric Co., Schenectady, N. Y. (Vol.80,p.903.)

Designated as Type CR9523 three-shoe brake, this spring-set d.c. magnetic brake combines the mounting flexibility of the two-shoe brake and the braking surface protection of the band type brake. It is

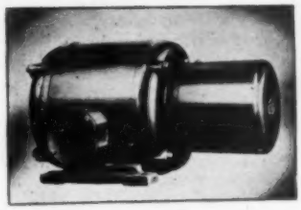


intended for use with steel-mill machinery, cranes, hoists, movable bridges, and conveyors where it is necessary to stop and hold a load at the motor armature. Braking in either direction is equal.

Brake, Motor-Mounted

Cutler-Hammer, Inc., 205 N. 12th St., Milwaukee, Wis. (Vol.80,p.1058.)

This totally inclosed, automatic solenoid-brake, for integral mounting with an electric motor, is available for use with fractional-horsepower to

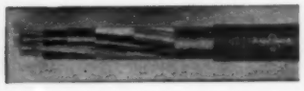


10-hp. motors. This brake can be furnished, already mounted with any motor, from the motor manufacturer. The brake is suitable for a.c. or d.c. applications.

Cable, Industrial, Flexible

Anaconda Wire & Cable Co., 25 Broadway, New York, N. Y. (Vol.80,p.829.)

"Powerduct" cable is particularly designed to connect equipment which may have to be relocated. It resists deterioration by oil, grease and gasoline and will withstand



abuse, including impact, without chafing or fraying. Three rubber-insulated 600 v. color-coded conductors and one bare ground conductor are cabled with saturated jute fillers, bound together by pre-saturated tape.

Lamp, Mercury-Vapor

General Electric Vapor Lamp Co., Hoboken, N. J. (Vol.80,p.281.)

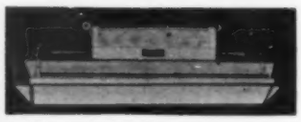
This 250-watt, high intensity mercury-vapor lamp has a tubular bulb and a standard screw-base socket. It has an efficiency of 25 to 30 lumens

per watt, and works efficiently in vertical and horizontal positions. Its operating life is rated at 2,000 hours, and it produces as much light as 425 watts in incandescent lamps.

Lamp Units, Daylight

General Electric Vapor Lamp Co., Hoboken, N. J. (Vol.80,p.900.)

A cool, color-corrected light, adapted to difficult seeing tasks, is obtained by combining mercury-vapor light and incandescent light in a single unit. The blue-green effect of mercury vapor lamps is balanced by the reds and yellows of the



incandescent light, producing a pleasing and eye-saving daylight effect. A total output of 11,200 lumens is evenly distributed through the 650 sq.in. of diffusing glass which forms an angular channel beneath the lamps. The lamp is either for 110- or 220-volt a.c. systems.

Lamp, Mercury Vapor-Incandescent

General Electric Vapor Lamp Co., Hoboken, N. J. (Vol.80,p. 219.)

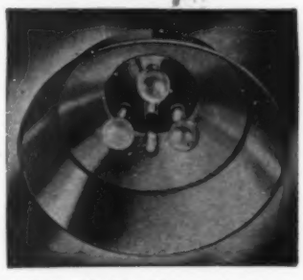
Color characteristics of both the mercury-vapor and incandescent lamps are combined in this self-contained "daylight" lighting unit. The full light value of both the tube and the

lamp are utilized. The regular unit with a 33-in. mercury tube and a 200-watt incandescent lamp operates at 500 watts and delivers a red-blue-green light which closely approximates afternoon sun.

Lighting Unit, Mercury-Mazda

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. (Vol.80,p.1019.)

This combination, 250-watt, mercury-mazda lighting unit, for industrial lighting where color correction is necessary, is designed for mounting heights



of 8 to 18 ft. This unit mixes the light qualities of the mazda with those of the mercury lamp, giving the required color correction.

Light Diffuser

Benjamin Electric Mfg. Co., Des Plaines, Ill. (Vol.80, p.902.)

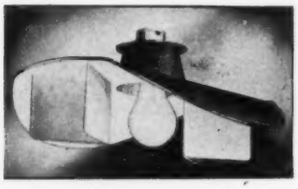
This combination mercury and incandescent lamp diffuser provides a soft light, providing a high degree of eye comfort. It is especially adapted to the

lighting of industrial operations, laboratories, drafting rooms and similar locations.

Lighting Unit, Bin and Stack

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. (Vol.80,p.976.)

This luminaire, designed to concentrate light on the vertical and horizontal surfaces of bins and stacks, consists of a reflector and socket cover, with



socket. Standard 60, 75 to 100-watt inside-frosted lamps can be used.

Transformers

Jefferson Electric Co., Bellwood, Ill. (Vol.80,p.215.)

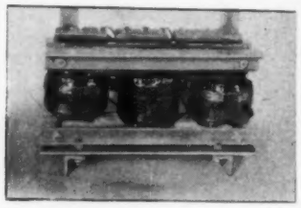
This line includes four styles of transformers and reactors and has been developed for mercury-vapor lamps. Types

to be mounted on walls, for suspension and fixtures indoors, and weatherproof types for outdoor use are included in the line.

Transformer, Three-Phase

Forbes & Myers, 172 Union St., Worcester, Mass. (Vol. 80,p.602.)

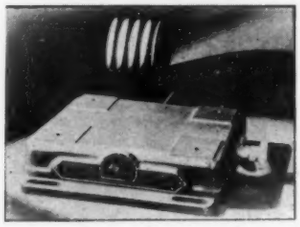
This three-phase transformer is designed to permit demonstration of machinery where only one voltage is available. The transformer will also serve machinery when a small plant moves to another building. It will change 220 to 440 and 550 volts, 440 to 220 and 550 volts, 550 to 220 and 440 volts, without any alteration in the transformer.



Motor Base, Automatic

Allis-Chalmers Mfg. Co., West Allis, Milwaukee, Wis. (Vol.80,p.214.)

The "Straitline" automatic ball-bearing motor base provides a convenient place from which to operate the "Vari-Pitch" sheave. The unit maintains a uniform belt tension throughout the speed-range adjustment. Its dial indicator shows the tension of the V-belts permitting full belt tension control and assuring maximum belt life.

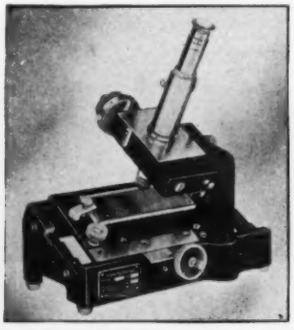


Gaging, Measuring and Testing Equipment

Comparator, Microscope

Stupakoff Laboratories, 6625 Hamilton Ave., Pittsburgh, Pa. (Vol.80,p.213.)

This comparator microscope is made for accurately measuring small points on tools and dies, and for inspection measurements. The microscope is 60-power, with an adjustable eye-lens for sharp focussing.



The carriage, on which the objects are fastened, moves 5 in. in one direction and 1 in. in the other. A 2-in. micrometer dial shows measurements in thousandths of an inch in one direction, and a vernier scale shows readings in hundredths of an inch in the other.

Dial Indicator, Full-Jeweled

Federal Products Corp., Providence, R. I. (Vol.80,p.741.)

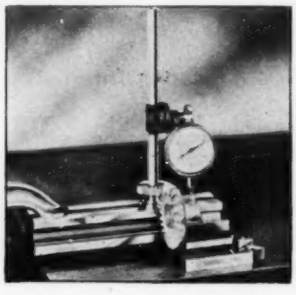
The action of this line of

full-jeweled, low-friction, dial indicators is light and free. The indicator point follows surface variations in and out, precisely and quickly. Out of roundness and other irregularities are easily detected.

Dial Indicator

L. S. Starrett Co., Athol, Mass. (Vol.80,p.940.)

The No. 655 dial test indicator can be furnished in a

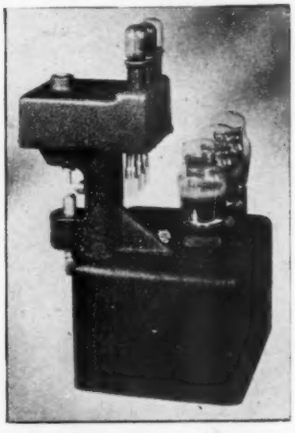


number of calibrations. It is shown here being used in combination with the No. 567 V-block and clamp for production inspection of bevel gears. The dial test indicator is furnished with a right-angle arm for adjustment beyond that obtainable with the standard horizontal arm.

Gage, Electronic, Semi-Automatic

Electronic Inspection Laboratories, 942 Prospect Ave., Cleveland, Ohio. (Vol.80,p.31.)

The Model LR2 semi-automatic gage for manual operation on any material up to and including 1 in. in diameter has a sensitivity of 0.000002 in., and can be set to within 0.00001 in. Space is provided for a dial indicator, reading to 0.0001 in., which is helpful

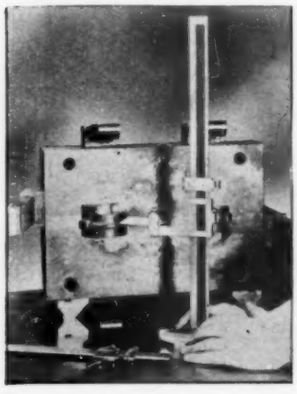


in setting up the gage. The three lights on top of the gage are operated by three "Inspectron" vacuum-tube relays. In using the instrument: if no lights burn the piece is undersize, if one or two lights burn the piece is good and if all three lights burn the piece is oversize.

Gage, Height, Vernier

L. S. Starrett Co., Athol, Mass. (Vol.80,p.902.)

The No. 454 vernier height gage for measuring and inspecting jigs, fixtures and similar work is shown being used

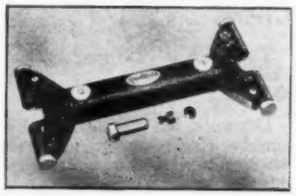


for a final inspection operation. The gage illustrated has a range of 18 in. and the bar is graduated on one side only, to be read by means of a vernier to 0.001 in. from 0 to 18 in. These gages are also available in 24- and 36-in. sizes.

Gages, Plug, Adjustable

Sheffield Gage Corp., Dayton, Ohio. (Vol.80,p.638.)

Twenty-three different standard sizes of plug gages provide a complete range covering a minimum of 2½ to a maximum of 12½-in. diameter. They can

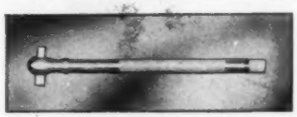


be furnished with either button- or pin-type anvils. Diameter of each gage is quickly adjusted within its range.

Gage, Telescoping

Lufkin Rule Co., Saginaw, Mich. (Vol.80,p.1092.)

The No. 79AA telescoping gage has a range from $\frac{5}{16}$ to $\frac{1}{2}$ in. The handle can be locked in the center of the plungers. The gage consists of a knurled

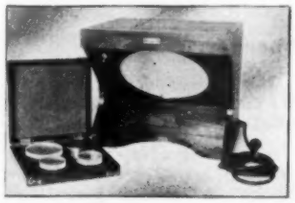


handle and two plungers, one telescoping into the other and both under constant spring tension.

Gaging Equipment, Light Wave

Van Keuren Co., 10 Copeland St., Watertown, Mass. (Vol.80, p.282.)

This outfit is suitable for testing the flatness of commercial lapped flat surfaces or for making length or diameter measurements of precision gage blocks, plug gages, or steel



balls. These flats are twice the accuracy previously guaranteed, and the semi-quartz material from which the flats are made shows better wearing qualities than the optical glass of former equipments.

Optical Flat

Mico Instrument Co., 10 Arrow St., Cambridge, Mass. (Vol.80,p.34.)

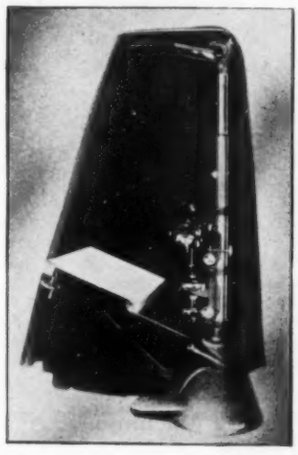
Accurate to 1/10 wave length of green light, these optical flats are 4 in. diameter by ¾ in. thick and are designed for

shop, tool-room and laboratory use.

Profile Projector, Model P.K.P.

E. L. Leitz, 60 East 10th St., New York, N. Y. (Vol.80, p.562.)

Inspection and measurement of component parts can be carried out rapidly by means of the Leitz Model P.K.P. profile control projector. The table has a longitudinal movement of about 4½ in., actuated by a handwheel. The intermediate

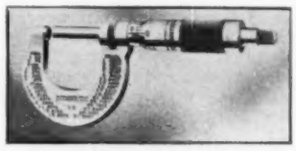


stage can be made to revolve and the angle of revolution read on a graduated scale and vernier. For measuring purposes an etched glass scale is laid on the intermediate stage and projected simultaneously with the object under test.

Calipers, Micrometer, Nos. 12 and 13

Brown & Sharpe Mfg. Co., Providence, R. I. (Vol.80, p.599.)

A new design has been announced for micrometer calipers, Nos. 12 and 13. The narrow anvil end of the frame allows for measuring deep in slots. Range of the No. 12 is from 0 to 1 in. by thousandths, and of the No. 13 from 0 to 1 in. by ten-thousandths.



Caliper, Micrometer, Improved

Swedish Gage Co. of America, 7310 Woodward Ave., Detroit, Mich. (Vol.80,p.745.)

A hardened, ground and lapped leadscrew is now featured in the "Swedish" line of micrometer calipers. Advantages are: (1) The leadscrew is hardened throughout its length

so that the threads resist wear; (2) the threads are ground after hardening to eliminate loss of accuracy from distortion, and (3) the threads are lapped after grinding to rectify slight errors in pitch diameter and lead.

Calipers, Micrometer, Stainless

Brown & Sharpe Mfg. Co., Providence, R. I. (Vol.80,p.934.)

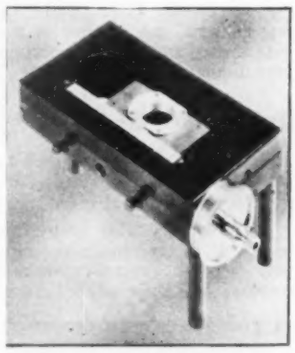
The stainless steel frame and thimble of the No. 12B and No. 13B micrometer calipers are proof against rust and stain caused by handling or liquids.

Having the new Type "C" frame with a narrow anvil, they can be used for measuring in slots. Range of the No. 12B is from 0 to 1 in. by thousandths, and of the No. 13B is from 0 to 1 in. by ten-thousandths.

Micrometer Slide, for Microscopes

Mico Instrument Co., 10 Arrow St., Cambridge, Mass. (Vol.80,p.34.)

This ball-bearing slide is introduced for use where accurate measurements are to be made by moving a microscope with a precision screw. Between the ways is a hardened steel carriage which is moved between preloaded ball bearings



by a nut that engages the screw. On the end of the screw is a dial graduated in 100 divisions, each of which represents a travel of 0.01 mm. of the telescope slide. An adapter takes a standard microscope, or may be removed and a stage mounted for viewing objects under a fixed microscope mounted separately.

Rule, Lay-out, Stainless Steel

George Scherr Co., 128 Lafayette St., New York, N. Y. (Vol.80,p.675.)

Angular and linear measurements can be made quickly with this "Chesterman" stainless-steel rule. The rule serves as a protractor and can be set accurately to any desired angle

by means of a pair of dividers. The dividers are set from a line of chords engraved on one side of the rule and the blades are then opened until the dividers span points engraved on the blades.

Square, Precision

Mico Instrument Co., 10 Arrow St., Cambridge, Mass. (Vol.80,p.34.)

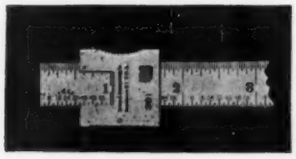
This precision square measures 4½x4½x1½ in. and the faces are scraped so that the angle is 30 deg. to within 0.0001 in. in 4½ in. It is particularly adapted for use with

the micrometer slide offered by this concern and for use in accurate set-up and inspection operations.

Rule Slide, No. 381

Brown & Sharpe Mfg. Co., Providence, R. I. (Vol.80, p.939.)

The No. 381 rule slide can be used in combination with any one of several standard rules. This slide applied to a

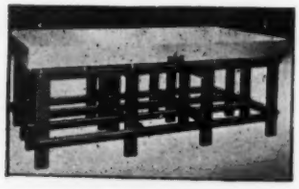


"Hook" rule will convert it to a "Caliper" rule. Used with a straight rule it will facilitate shoulder-to-flange and similar measurements.

Surface Plate, Layout

Challenge Machinery Co., Grand Haven, Mich. (Vol.80, p.896.)

A line of improved semi-steel surface plates, designed particularly for accurate layout and inspection work, is now available. These semi-steel



plates are planer finished, smooth, square and heavily ribbed to prevent sagging. Standard sizes range from 12x18 in. to 48x96 in.

V-Block and Clamp

L. S. Starrett Co., Athol, Mass. (Vol.80,p.744.)

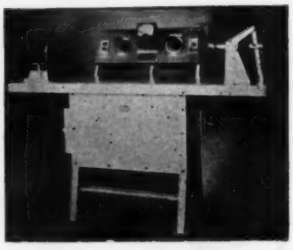
The No. 567 V-block is of steel, hardened and ground. The forged clamp has an adjustable support to keep the block from tilting when rested on its side. The block is commercially accurate and makes a support for duplicate parts inspection with

a dial indicator. It is approximately 1¾ in. square with a base length of about 3⅜ in. and a capacity of 1⅞ in. diameter.

Magnetizing Machines, Magnaflux Inspection

Magnaflux Corp., 333 N. Michigan Ave., Chicago, Ill. (Vol.80,p.834.)

The Model D-701 and the Model DY-703 units are for magnetizing parts prior to dusting with Magnaflux powder or immersing in Magnaflux liquid to determine cracks. The D-701 unit illustrated is a three-pur-

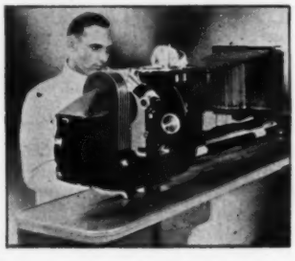


pose unit adapted to both the detection of longitudinal and transverse defects and to the removal of any residual magnetism after the parts have been inspected. The tailstock may be adjusted to take parts up to 72 in. long. Type DY-703 unit is designed for inspection of crankshafts of the larger sizes.

Metallographic Outfit

Bausch & Lomb Optical Co., Rochester, N. Y. (Vol.80, p.834.)

This complete metallographic outfit for work with bright-field polarized light and dark field has a magnification range from 2.5 X to the highest possible with oil-immersion objective and high-power eye-

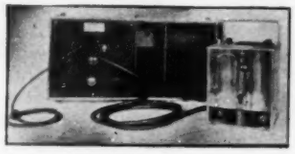


piece. It consists of the inverted microscope unit, illuminating system, 8x10 camera, supporting bed and stand, built-in shock absorbers, large cabinet for accessories and caster stool. The microscope has a 6-in. circular stage.

Stroboscope, Portable

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. (Vol.80,p.217.)

A portable "Stroboglow" unit that produces brighter strobo-

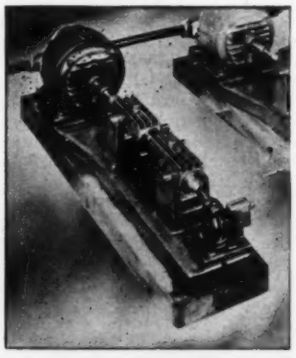


scopic images than have been attained heretofore is now available. This instrument develops momentary illumination of 300,000 cp. and is designed to analyze any periodic movement from 100 to 30,000 cycles per min., such as vibration of rotating and reciprocating apparatus. It is also suitable for sequence analysis of mechanisms which have motions of a recurrent nature, such as sewing machines, moving-picture cameras and machine guns.

Testing Machine, Fatigue

Southwark Division, Baldwin-Southwark Corp., Philadelphia Pa. (Vol.80,p.832.)

The R. R. Moore improved fatigue tester has five times the testing speed of former models. This machine is based on the rotating beam principle, the specimen functioning as a simple beam symmetrically



loaded at two points. Test specimens pass through a complete cycle of flexural stress during each revolution of the machine. Specimens may be made to various diameters and with grooves, notches, shoulders, or with welded, soldered or brazed joints.

Testing Machines, Fatigue

G. N. Krouse, 1737 Freeport Rd., New Kensington, Pa. (Vol.80,p.833.)

Two types of high-speed fatigue machines are shown: the one on the right being adapted for wire fatigue tests, while the machine on the left is adapted for the Wohler type of fatigue testing.

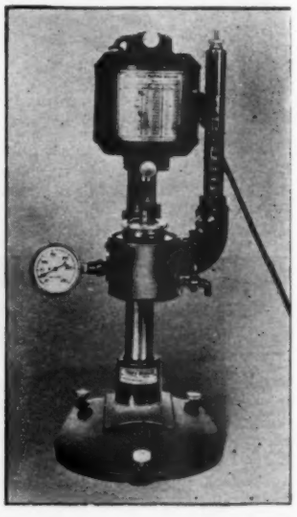
The wire fatigue machine uses a pin-ended column type of specimen. One end is held in the high-speed motor chuck and the other end retained in a special self-aligning ball bearing. The machine tests specimens from ⅛ to ¼ in. in diameter and the length is usually taken as 100 times the specimen diameter. A counter registers up to 100 million cycles of stress.

By replacing the wire testing adapter with a scale beam and loading arm, this machine may be adapted for the Wohler cantilever fatigue test as shown at the left.

Testing Machine, Grease

Taft-Peirce Manufacturing Co., Woonsocket, R. I. (Vol. 80,p.712.)

Designed by the Bearing Engineers Committee to test the mechanical stability of grease, this machine works a definite amount of grease in a moderate-sized bearing running at medium speed, at various test



temperatures. The machine, built by Taft-Peirce Mfg. Co., indicates the lubricating value of the grease and gives definite information on starting and running-torque, oil separation, change in structure and consistency, channeling, leakage past bearing seals, aeration and the consequent increase in grease volume.

Speeder, Gear

Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich. (Vol. 80,p.389.)

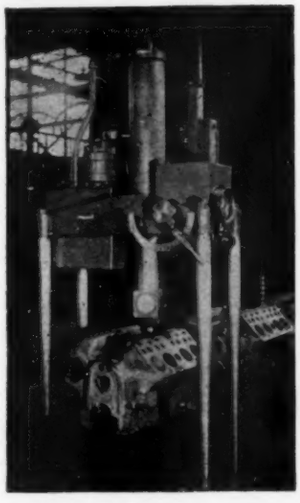
A gear speeder, designed to simulate actual operating conditions in testing gears for quietness, is made by this concern. Pairs of production gears are run together forwards and reverse, under load, while being checked. The speeder has two spindles, each having its own drive and brake, all controlled through a single hand-

wheel. The machine takes gears up to 14 in. in length on the rear, and up to 17 in. in length on the front spindle, allowing for the largest gear-clusters.

Testing Machine, Hardness, Brinell

Detroit Testing Machine Co., 5137 Trumbull Ave., Detroit, Mich. (Vol.80,p.835.)

This power-driven direct-reading Brinell testing machine of large capacity has been developed for the rapid



testing of cylinder blocks of different sizes. With the block support and distance pieces removed, fixtures for other purposes may be mounted on the base which is flat and of large area.

Testing Machine, Hourglass Worm

Fellows Gear Shaper Co., Springfield, Vt. (Vol.80,p.595.)

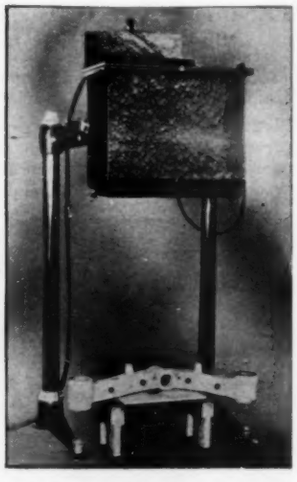
A "Red Liner" is now available for checking hourglass steering worms. The machine indicates the amount of clearance between the worm and sector or roller with index lines for each quarter revolution of the worm. It operates on the same principles as the "Red Liner" used for checking external and internal gears, with

the exception that it is hand operated only. Magnification is 40 to 1 for English and 50 to 1 for metric measure.

Testing Machine, Radiograph

General Electric X-Ray Corp., 2012 Jackson Blvd., Chicago, Ill. (Vol.80,p.835.)

This industrial radiograph unit for inspecting and examining welds and castings of intermediate thickness, is a small,

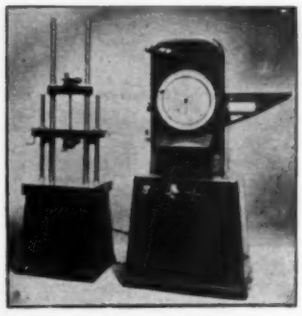


200,000-volt shock-proof unit requiring no more than 8 ft. square for its operation. The high-voltage head may be angulated to any position.

Testing Machine, Tensile-Strength

Tinius Olsen Testing Machine Co., 500 N. 12th St., Philadelphia, Pa. (Vol.80,p.1093.)

The hydraulic universal testing machine as shown is available in capacities from 20,000 to 200,000 lb. These machines weigh the load on a self-indicating pendulum dial. The load is applied to the specimen by hydraulic means from a pump housed in the cabinet below the

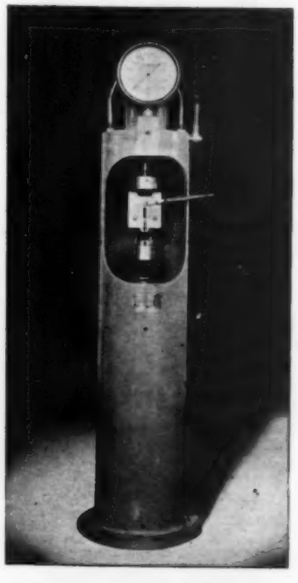


pendulum dial. The dial is uniformly graduated to give a straight line calibration over its entire range. For recording the stress-strain diagram, an autographic attachment is mounted to the right of the pendulum dial. All charts are made on rectangular paper.

Testing Machine, Weld

Baldwin-Southwark Corp., Philadelphia, Pa. (Vol.80, p.973.)

Developed for accurately testing the strength of spot welds, this 5-ton hydraulic tension testing machine is a convenient unit for all kinds of tensile testing. The machine weighs approximately 800 pounds and is supplied with an 18 in. diameter base for rolling



it from one position to another. A hoisting hook is provided for moving the unit by crane. Overall height is 70 in.

Testing Machine, Stiffness

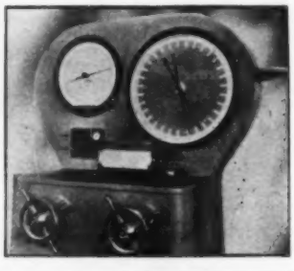
Tinius Olsen Testing Machine Co., 500 N. 12th St., Philadelphia, Pa. (Vol.80,p.835.)

Information concerning properties of sheet metal and wire can be found with this stiffness tester of Tour-Marshall design. It will measure maximum bending moment from 2 to 60 oz.-in. by 2 oz.-in. steps and will determine the permanent set and plastic flow under load. The machine weighs only 6 lb. and is easily set up.

Load Indicator, Testing Machine

Southwark Division, Baldwin-Southwark Corp., Philadelphia, Pa. (Vol.80,p.832.)

The Tate-Emery loading indicator for hydraulic testing machines has 1,200 graduations on a 63.5-in. scale. Two ranges are shown on the one scale. The high range to 60,000 lb. is in 50 lb. graduations, and the low range to 6,000 lb. is by 5 lb. graduations. Shifting the ranges is accomplished by turning a dial knob and opening the proper valve. The recorder drum is driven directly from the load weighing system.

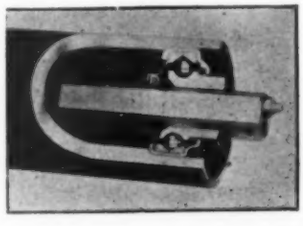


Material-Handling Equipment

Conveyor Bearings, Protected

Standard Conveyor Co., North St. Paul, Minn. (Vol.80, p.601.)

Four types of protected bearings have been developed for use with gravity conveyors. Pro-

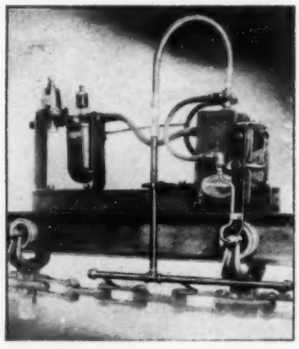


tection against dust and grease loss is provided. The felt washers make the unit adaptable for use where a greased bearing is required and where any dripping of grease would be objectionable.

Conveyor Lubricator, Automatic

J. N. Fauver Co., 91 Selden Ave., Detroit, Mich. (Vol.80, p.782.)

This automatic conveyor trolley-wheel and chain-pin lubricator applies lubrication to every bearing in the form of an oil fog. Pressure from the plant air line is regulated by a

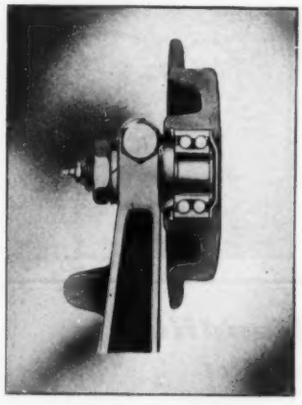


Norgren valve and then passes through a Norgren air line lubricator where oil is fed drop by drop to the air stream to form a fine mist.

Trolley Wheel, Tramrail

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, Ohio. (Vol.80,p.218.)

The wheel is made of a high-strength cast iron with a deep-chilled tread and flange. A slight crown of the wheel tread

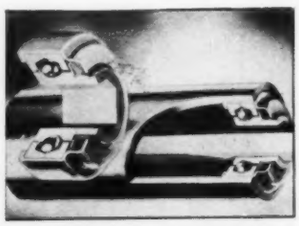


brings the wear on the rail flange in from the outside. The straight flange reduces rolling friction.

Conveyor Roller

Mathews Conveyor Co., Ellwood City, Pa. (Vol.80,p.254.)

Rollers, in whatever lengths required, are available in seven-

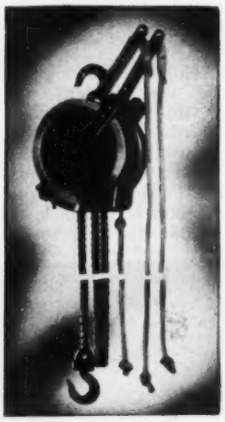


teen diameters, from 1 to 7⅝ in. Capacities range from 50 lb. continuous load rating for the 1-in. size to 8,000 lb. for the 7⅝-in. roller.

Hoists, Chain

Coffing Hoist Co., Danville, Ill. (Vol.80,p.33.)

The "Challenger" line of spur gear, twin power, gravity lowering chain hoists is made in ¼, ½, 1 and 2 ton capacities. The first two capacities operate on direct drive, while the 1- and 2-



ton units have planetary gears. Twin levers, with rope pull, operate on the face of disk wheels by friction grip, eliminating the need for a hand chain.

Hoist, Chain, Spur-Geared

Conco Engineering Works, 874 Jefferson St., Mendota, Ill. (Vol.80,p.710.)

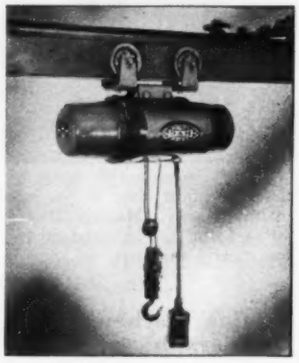
Spur-geared hand chain hoists are available in capacities from 1/6 to 6 tons. A safety load-chain guide is provided as "jam

insurance." Precision ball bearings reduce the energy required to move a given load.

Hoist, Electric, "Zip-Lift"

Harnischfeger Corp., 4400 W. National Ave., Milwaukee, Wis. (Vol.80,p.279.)

The "Zip-Lift" electric hoists have capacity ratings from 250 to 500 lb. Designed primarily for "spot handling," these units

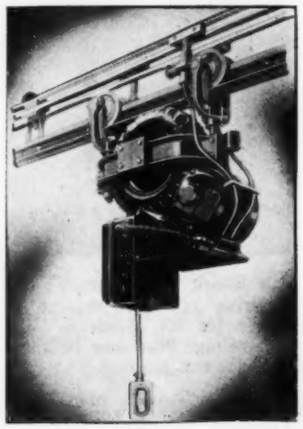


are of all-welded construction. The hoists have hoisting speeds up to 32 ft. per min., and are controlled either by push button or pendant rope.

Hoist, Monorail, Pneumatic Tire Drive

American Monorail Co., 13107 Athens Ave., Cleveland, Ohio. (Vol.80,p.254.)

A pneumatic rubber tire, pressing against the bottom of overhead rail of a monorail system, improves the control in

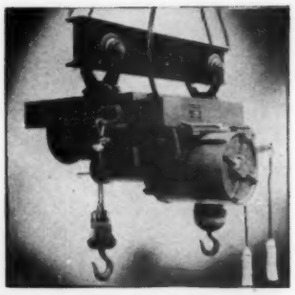


overhead rail of a monorail hoist. An electric motor, with reducer, drives the wheel on which is mounted the pneumatic tire. The tire increases traction.

Hoist, Monorail, Twin-Hook

Electro Lift, Inc., 30 Church St., New York, N. Y. (Vol.80, p.282.)

The twin-hook monorail elec-



tric hoist is designed in capacities of ½ to 3 tons and is used for long or bulky loads. The load, lifted from two points, is carried without twisting.

Tractor, Industrial

Mercury Mfg. Co., 4118 S. Halsted St., Chicago, Ill. (Vol. 80,p.975.)

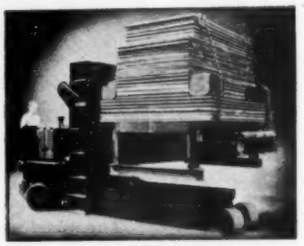
The "Huskie" industrial tractor is powered with a 4-cylinder Ford engine and has a 4-speed truck-type transmission. It is 96 in. long, excluding coupler, and is 48 in. wide. The wheelbase is 54 in. and the turning

radius is 108 in. It is capable of developing up to 3,000 lb. drawbar pull and travels at speeds up to 10 m.p.h. Weight is 3,450 lb.

Truck, Elevating, Die-Handling

Automatic Transportation Co., 101 W. 87th St., Chicago, Ill. (Vol.80,p.1090.)

This "Automatic" Model TLN-30 industrial truck was designed and built for the safe handling of large 30-ton dies to and from the presses and storage racks. Lift platform permits handling the large dies with a minimum of time and labor.



Trucks, Elevating, Gas-Powered

Baker-Raulang Co., Cleveland, Ohio. (Vol.80,p.1091.)

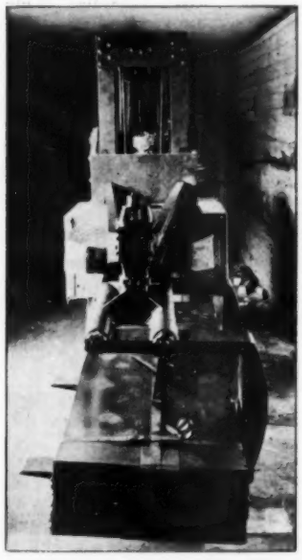
Three gas-powered elevating

trucks are available in capacities of three, four and five tons. All trucks have a maximum speed of 10 m.p.h., but are governed to 7½ m.p.h. A 46½ hp. Hercules Type IXB engine is used. The selective transmission provides two speeds in both directions.

Truck, Fork-Type

Baker-Raulang Co., Cleveland, Ohio. (Vol.80,p.69.)

A swivel fork attachment for the standard 5-ton "Hy-Lift" truck adapts it for loading or unloading cars of packaged sheet steel. When applied to

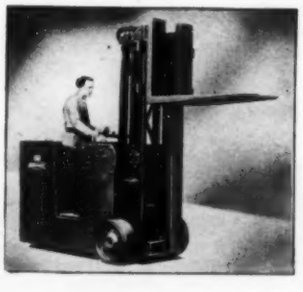


the standard 55-in. long platform, one man and the truck can handle steel in bundles up to 3 tons in weight, 30 in. in width, and 96 in. in length.

Truck, Fork-Type, Heavy-Duty

Automatic Transportation Co., 101 W. 87th St., Chicago, Ill. (Vol.80,p.356.)

This heavy-duty, center-control, tiering fork truck of 10,000



lb. capacity has been developed for loads up to 72 in. long. It will operate in a 94 in. intersecting aisle. Front wheel drive provides tractive ability on ramps.

Truck, Fork-Type, 6,000 lb.

Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland, Ohio. (Vol.80,p.216.)

A heavy-duty, electric fork-type truck has been developed for loads of 6,000 lb. It develops traveling speed of 525 ft. per min. Forks, for handling

skids or pallets, are built to specification. When tiering, loading forks can be hoisted at the speed of 15 ft. per min.

Truck, Lift, Checkless

Barrett-Cravens Co., 3255 W. 30th St., Chicago, Ill. (Vol. 80,p.531.)

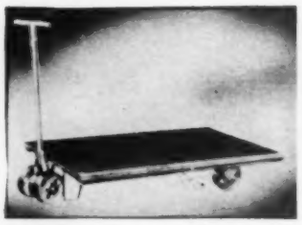
A checkless lift truck of 1-ton capacity is available for any type, make and size of skids. It can be had in 6, 7, 9 and 11 in. heights and either 18 or 24

in. width. The length of the carrying frame ranges from 24 to 72 in., and the lift is 2 in. Load lifting is automatic.

Lift-Jack Unit

All Steel Welded Truck Corp., Rockford, Ill. (Vol.80, p.601.)

The Clark lift-jack unit for material handling is used with welded platform skids for movement of materials and parts in plant operations. It consists of a lifting mechanism carried between two wheels and is attach-



able and detachable quickly from the welded steel platform. The jack unit has a lifting power of 6,000 lb. and employs a fulcrum lift mechanism. It weights 42 lb. and requires only 76 lb. handle pressure to operate.

Truck, Lift, Hydraulic

Lyon Iron Works, Greene, N. Y. (Vol.80,p.604.)

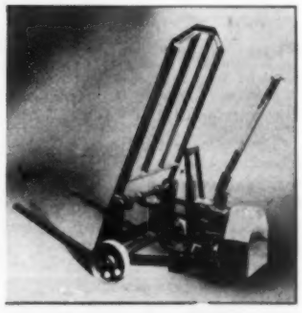
A 15-ton hydraulic hand lift truck was constructed for transferring dies to and from large stamping presses. The

carrying platform is 30x84 in. long.

Truck, Lift, Pallet

Yale & Towne Mfg. Co., Philadelphia, Pa. (Vol.80, p.712.)

The Model KATC fork-type truck with tilting forks and counterweighted front end has



been developed for plants receiving goods on wooden pallets. It will handle both single-faced and double-faced pallets, has a capacity of 700 to 1,125 lb. and is equipped with forks measuring 31½ in. long by 2 in. wide.

Truck, Lift, Type XB

Yale & Towne Mfg. Co., Philadelphia, Pa. (Vol.80, p.747.)

The XB multi-stroke hand-

lift truck has a lift of 10 in. and a capacity of 8,000 lb. It is equipped with chain lift and the load may be elevated by one operation to full height. Twenty-two forward strokes of the handle elevate the load.

Truck, Lift, Pallet

Barrett-Cravens Co., 3255 W. 30th St., Chicago, Ill. (Vol.80, p.818.)

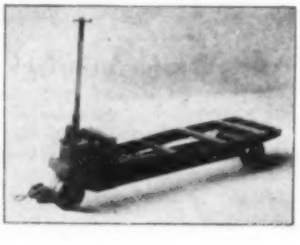
This hand-operated lift truck to handle low 3½-in. pallets of tinplate, strip steel and other products, is made in capacities of 2,500 and 3,500 lb. The carrying frame is 15 in. wide overall, with a 5-in. space between

the two forks. A low 3½-in. frame height permits handling skids or pallets with a 4-in. clearance. The 2¼-in. lift is accomplished with one stroke of the handle.

Truck, Lift, Heavy-Duty

Yale & Towne Mfg. Co., Philadelphia, Pa. (Vol.80, p.899.)

Designed for loads ranging

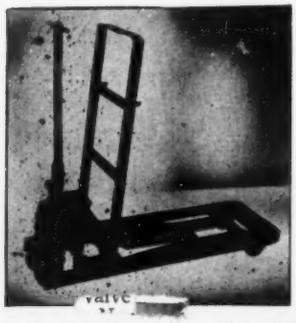


from 10,000 to 20,000 lb., the Yale XB multi-stroke truck has a multi-stroke lifting head with chain lift. Six 6 in. face steel wheels, with 3 in. face twin front wheels make it possible to move heavy loads without breaking up floors. Coupled to a tractor.

Truck, Lift, Hinged Frame

Yale & Towne Mfg. Co., Philadelphia, Pa. (Vol.80, p.820.)

This double-duty, hinged-frame hand truck handles skid platforms of varying under-clearance. When the frame is upright, the truck may be rolled under platforms having clearance of 7½ in. A few quick

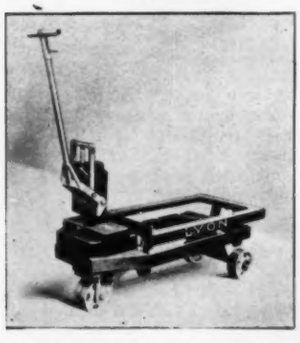


strokes on the handle raises the load 3 in. from the floor. Where platforms with clearance ranging from 8 to 10 in. are to be moved, the hinged frame is dropped into place on the regular frame.

Truck, Lift, Hydraulic

Lyon Iron Works, Greene, N. Y. (Vol.80,p.900.)

The 10-in. elevation lift truck operates by raising a top frame through levers. The head containing the hydraulic mecha-



nism is similar to the standard Lyon hydraulic lift truck having a 3 in. elevation.

Truck Frame, Adjustable Lift

Barrett-Cravens Co., 3255 W. 30th St., Chicago, Ill. (Vol. 80,p.1024.)

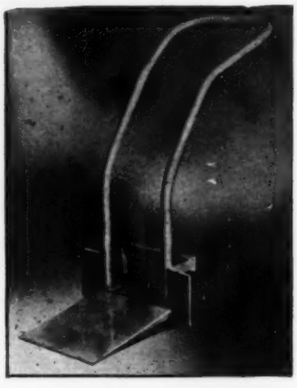
This auxiliary-lift truck frame has been developed for

use with skid trucks made by this concern. When mounted on a truck 6 in. high in the lowered position, the unit can handle skids with a clearance of 6½ to 10½ in. and when used with a truck 7 in. high it will handle skids with underneath clearances up to 12 in.

Truck, Shovel-Type

Pollard Bros. Mfg. Co., 4444-52 N. Knox Ave., Chicago, Ill. (Vol.80,p.674.)

A shop box filled with parts can be picked up from the floor and moved without spilling its

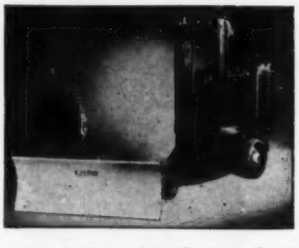


contents by means of this shovel truck. It is pushed under the load with the foot, and the load is pushed off with the foot.

Plow, Snow

Easton Car & Construction Co., Easton, Pa. (Vol.80,p.970.)

This "Silver Blade" snow plow can be easily attached to the platform of any high- or low-lift industrial truck. It is intended for removing snow from factory runways, yards



and similar locations where trucking passages must be cleared. Snow can be pushed to either side of the runway or straight ahead by setting the blade to the proper angle to throw the snow.

Materials

Babbitt, Tin-Base

Bunting Brass & Bronze Co., Toledo, Ohio. (Vol.80,p.711.)

A tin-base babbitt is available for all applications where high speeds, severe vibration, heavy shock and impact loads necessitate the use of metal with high load-carrying capacity and the ability to withstand extreme temperatures. It is cast in divisible 5-lb. bars.

Beryllium Castings

Beryllium Corp. of Pa., Reading, Pa. (Vol.80,p.746.)

Heat-treated beryllium castings combining high strength and high electrical conductivity can now be supplied. These castings are of a heat-treatable copper-base alloy having the following properties: electrical conductivity, 50 per cent of copper; tensile strength, 95,000 lb. per sq.in.; elastic limit, 85,000 lb. per sq.in.; elongation in 2 in., 5 to 8 per cent; hardness, 96-98 Rockwell B.

Bronzes, "D-H-S"

Bartlett Hayward Div., Koppers Co., Baltimore, Md. (Vol. 80,p.1096.)

"D-H-S" bronzes are available in four grades for castings or forgings. These bronzes have a fine and dense grain structure and the five constituent metals are uniformly distributed. High compressive strength, ductility, hardness, resistance to acids and ability to withstand wear and shocks are claimed. No. 1 has tensile strength of 120,000 lb. per sq.in.

Galvanized Sheet, "Paintgrip"

American Rolling Mill Co., Middletown, Ohio. (Vol.80, p.781.)

Armco galvanized "Paintgrip" sheets can be painted without special surface treatment. These steel sheets have the value of full coated galvanized sheets, with the added protection of a special insulating coating that keeps the paint from direct contact with the zinc surface.

K-Copper

Hackett Brass Foundry, Detroit, Mich. (Vol.80,p.747.)

Hackett "K-Copper" combines the physical properties of steel and bronze with the high electrical and heat conductivity of copper. It has equal corrosion resistance, the same coefficients of expansion and resistivity and modulus of elasticity as copper and a hardness of 70 to 80 Rockwell B, 125 to 150 Brinell. Its ultimate strength is 70,000 lb. per sq.in., elongation is approximately 20 per cent, reduction in area 50 per cent, in drawn rod 83 per cent in electrical conductivity of pure drawn copper. In forged form its conductivity is 75 to 85 per cent that of forged copper.

Plastic, Heat Resistant

General Plastics, Inc., North Tonawanda, N. Y. (Vol.80, p.889.)

Temperatures up to 450 F. will not affect moldings made of this improved heat-resistant material. The material, available in black and brown and known as Nos. 34 and 37, is intended for such uses as electric iron handles, heater and appliance plugs, and other parts which must retain their electric strength without carbonization under relatively high heat.

Plastic, High Impact Strength

General Plastics Inc., North Tonawanda, N. Y. (Vol.80, p.1093.)

Durez No. 1547 Black is a plastic material for high impact strength moldings. This material has an impact strength of 0.5 according to A.S.T.M. standards, and has a weight of 22.4 g. per cu.in. Moldings of this material can be machined and sanded and subsequently buffed back to the normal lustre.

Steels, Stainless

Ludlum Steel Co., Watervliet, N. Y. (Vol.80,p.1096.)

Grade designations of part of the Silcrome series of chrome-nickel stainless steels has been changed so that in the future these steels will be designated by number indicating as closely as possible their composition. For example, the steel formerly known as Silcrome KA2 is now designated as Silcrome 18-8.

Steels, Sicromo

Timken Steel & Tube Co., Canton, Ohio. (Vol.80,p. .)

Sicromo 1, 2, 3, and 5, have been developed for high temperature applications. These steels contain the 0.50-per cent molybdenum which has been

found most effective for increasing creep strength on an economic basis. Their high-silicon content develops the desired degree of oxidation resistance while economic resistance to corrosion is assured by the varying percentages of chromium indicated by the identifying numbers.

Steel, "Armco H.T.-50"

American Rolling Mill Co., Middletown, Ohio. (Vol.80, p.320.)

The impact tensile strength of "Armco H.T.-50" is 5,000 ft.-lb. per sq.in., nearly double that of mild steel. Care has been taken to avoid strength in excess of actual requirements, to permit advanced fabrication and welding methods. The endurance limit is 48,000 lb. per sq.in., yield point is 47,000 lb. per sq.in. in the hot-rolled grades, tensile strength is 67,000 lb. per sq.in. in the hot-rolled grades and 70,000 in cold-rolled. Elongation in 2 in. is 28 per cent in hot-rolled sheets.

Steel, Stabilized

American Rolling Mill Co., Middletown, Ohio. (Vol.80, p.604.)

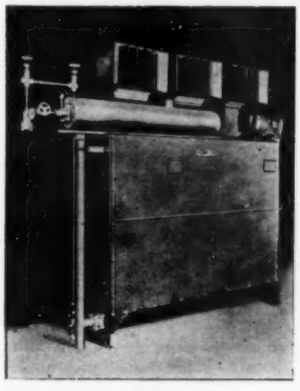
"Armco" stabilized steel is available in the form of cold-rolled sheets and strip. It is a uniform, deep-drawing and non-aging type with all stretcher strains permanently eliminated in the tempered condition. It retains indefinitely the properties of temper-rolled steel, making prefabrication treatments unnecessary. The stabilized steel has no sharp yield point in the temper-rolled condition.

Miscellaneous Equipment

Air Conditioners, Industrial

York Ice Machinery Corp., York, Pa. (Vol.80,p.179.)

This line of industrial air conditioner units is designed to meet a wide range of industrial air-cooling requirements at low operating cost. Models FB-500, FB-800, FB-400 and FB-



2000 can be installed in any factory with or without distributing ducts. Thermostats automatically control the room temperature at any desired level.

Condenser, Air-Line HP-504-2

DeVilbiss Co., Toledo, Ohio. (Vol.80,p.1024.)

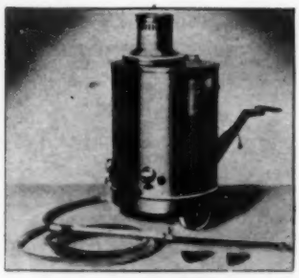
The improved extra-heavy-duty condenser, Type HP-504-2,

removes oil and water from air lines. This is accomplished by a baffle arrangement within the condenser and a pair of filter pads. These filter pads can be removed and replaced without disconnecting the condenser.

Cleaning Jenny, "Hypressure"

Homestead Valve Mfg. Co., Coraopolis, Pa. (Vol.80,p.531.)

The Model G "Hypressure Jenny" is a vapor-spray cleaning unit. Cleaning is done by applying a combination of water



vapor, hot water and cleaning chemicals, over a pressure range from 50 to 150 lb. per sq. in., through a nozzle to the surfaces to be cleaned.

Dust Collector, "Dustube"

American Foundry Equipment Co., Mishawauka, Ind. (Vol.80,p.840.)

This improved "Dustube Collector" has a filtering means composed of banks of special fabric tubes. These tubes are hung on racks which have a shaking action, keeping the filtering surfaces free from dust deposits at all times.

Scale, Industrial, "Shadowgraph"

Exact Weight Scale Co., Columbus, Ohio. (Vol.80,p.899.)

The "Shadowgraph" is designed for weighing manufactured parts. All indicating mechanism is eliminated, and a simple shadow is substituted,

obviating the possibility of parallax readings. The new scale registers twice as much travel per ounce as former models.

The balance ball, beam, poise and other working parts are totally inclosed. An oil dashpot is used to dampen the movement. About 30 per cent of the usual parts have been eliminated.

Stool, Factory, Wedge-Lock

Pollard Bros. Mfg. Co., 4449 N. Knox Ave., Chicago, Ill. (Vol.80,p.525.)

Each leg is one piece of angle steel notched and bent to form the rest for the wood seat. The design is so arranged that pressure forces the flat steel stretchers against the corners, keeping the stool rigid.

Small Parts Cabinet, "GF Holdsall"

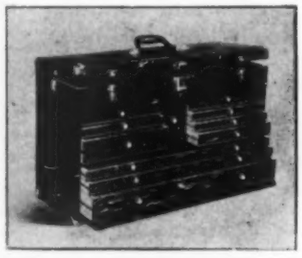
General Fireproofing Co., Youngstown, Ohio. (Vol.80, p.940.)

The "GF Holdsall" small parts cabinet is suitable for systematic storage of small parts. The ten drawers are of varying height. Parts up to 9¼x14¼x3¼ in. may be accommodated. Over-all dimensions: 20⅞ in. wide; 30⅞ in. high; 15¼ in. deep.

Tool Chest, 26-In.

Gerstner Tool Chests, 157 Columbia St., Dayton, Ohio. (Vol. 80,p.819.)

This tool chest, made 26 in. long to accommodate the 24-in. scale used by patternmakers, machinists and toolmakers, has ten drawers of assorted sizes,

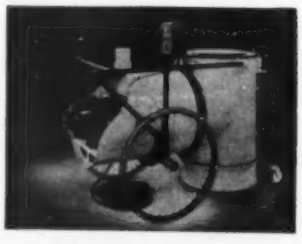


and an upright drawer compartment. The front lid swings up and locks automatically when the top lid is closed.

Vacuum Cleaners, Industrial

Spencer Turbine Co., Hartford, Conn. (Vol.80,p.839.)

Heavy-duty industrial vacuum cleaners for heavy or bulky litter are built in ¾, 2, 3 and 5 hp. models. A wide choice of cleaning tools is available for all types of plant and factory cleaning.



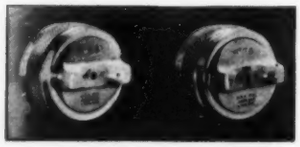
Heavier models are fitted with wide-flange, rubber-tired wheels and the smaller units are equipped with bicycle-type and large disk wheels. These rubber-tired wheels permit movement of the units from place to place without difficulty. A starting switch is mounted on the 2-hp. unit shown.

Paint-Spray Equipment

Air Caps, Spray Gun

DeVilbiss Co., 269 Phillips Ave., Toledo, Ohio. (Vol.80, p.175.)

Two additional air caps are available for the MBC spray gun. The No. 76 cap, right, is for lacquers, primers and heavy-bodied synthetics in volume production. It has three auxil-

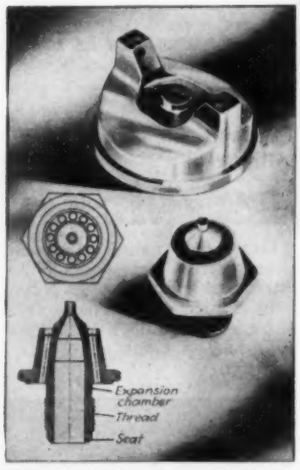


iary atomizing jets to produce a wide, straight-sided pattern. The No. 54 cap, left, is of the narrow-horn, twin-jet type and produces a wide, even spray without split.

Nozzles and Atomizer Heads, Spray Gun

Alexander Milburn Co., 1493 West Baltimore St., Baltimore, Md. (Vol.80,p.782.)

A nozzle, bottom, is made of wear-resisting steel. Air passages, closely spaced, provide a large annular air supply to atomizer head, resulting in a



perfectly atomized spray. The bronze atomizer head, top, is made with straight air passages to eliminate friction and to make it easy to clean.

Cup, Spray Painting

DeVilbiss Co., 269 Phillips Ave., Toledo, Ohio. (Vol.80, p.181.)

This one-quart paper paint cup has been developed for use with spray-painting equipment. As the color is changed in painting, the cup can be inex-

pensively thrown away and a new paper cup installed.

Regulator, Air Pressure

DeVilbiss Co., 269 Phillips Ave., Toledo, Ohio. (Vol.80, p.1060.)

The Type HFS low-capacity regulator for air pressures below 30 lb. can be graduated with but one ounce variation for each 10 lb. variation in

main line pressure. Special valve design and construction prevents the valve seat from cutting into the rubber valve.

Spray Gun, Model 7

Binks Mfg. Co., 3114 Carroll Ave., Chicago, Ill. (Vol.80, p.748.)

The "Thor" Model 7 spray

gun is claimed to have greater speed, less air consumption and better atomization. The gun body is of drop-forged aluminum and has a black electrolytic coating for surface protection.

Spray Gun, Paint

Alexander Milburn Co., 1436 West Baltimore St., Baltimore, Md. (Vol.80,p.218.)

The Type MM paint spray gun is balanced like a pistol. Paint coverage and shape are controlled by turning two knurled nuts. Cleaning takes only a few seconds because parts touched by paint are in the single-unit detachable spray head.

Strainer, Fluid

DeVilbiss Co., 269 Phillips Ave., Toledo, Ohio. (Vol.80, p.672.)

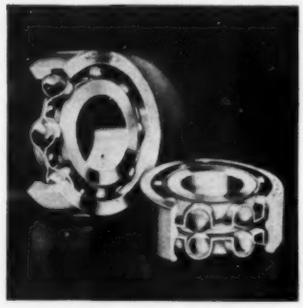
Type "VS" fluid strainer is connected by its upper, or outlet, connection to the fluid inlet of the "MBC" spray gun. The lower, or inlet, end of the strainer, to which the fluid hose is connected, is fastened to the lower end of the handle to prevent strain on the upper connection. The working part of the strainer consists of a screen reinforced with coiled spring which is inclosed in a metal tube.

Parts

Ball Bearings

Hoover Steel Ball Co., Ann Arbor, Mich. (Vol.80,p.70.)

Seventy-five sizes of radial and angular-contact type ball bearings have been added to the Hoover line. These additions embrace both the single and

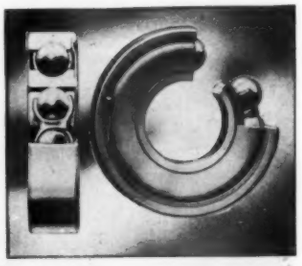


double-row type, all of which are made to SAE and U. S. Navy Department specifications.

Ball Bearings, Grease-Shielded

Fafnir Bearing Co., New Britain, Conn. (Vol.80,p.280.)

Grease-shielded ball bearings are being supplied in an increased range of sizes. They are equipped with single or double metal side-shields to retain the



lubricant and to exclude dirt and foreign matter. Single-row bearings are available in more than 50 sizes, with bores from 4 to 110 mm., and outside diameters from 16 to 225 mm. Twenty sizes of the double-row "single-shield" variety may be had. Bores range from 6 to 100 mm., and outside diameters from 19 to 215 mm.

Bearings, Grease Packed

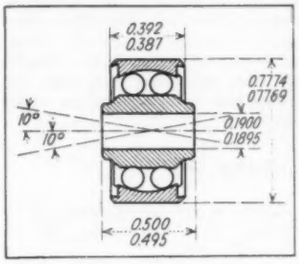
Norma-Hoffman Bearings Corp., Stamford, Conn. (Vol. 80,p.743.)

Wholly inclosed, sealed, precision bearings are now packed with a grease which is pretested for maximum stability. Use of this grease and the wrapping of each bearing in aluminum foil safeguard the bearings against oxidation and premature hardening of grease packed in the bearings.

Ball Bearings, Shielded, Self-Aligning

Fafnir Bearing Co., New Britain, Conn. (Vol.80,p.532.)

This group of ball bearings combines internal self-alignment with double grease-shield protection. The bearings are of the double-row type. The



DKS-3 has a static radial non-brinell capacity of 900 lb., and a static thrust capacity of 190 lb. Capacities for the larger DKS-4 are 1,100 and 240 lb., respectively.

Ball Bearings, Compact

Fafnir Bearing Co., New Britain, Conn. (Vol.80,p.820.)

This series of ball bearings from 20 to 260 mm. bore size, and known as 9500 Series, is designed for machine tool applications where unusual compactness and precision stand-

ards are required. Compared with standard SAE 200 Series, the bearings have considerably smaller outside diameters.

Ball Bearings, Duplex, Type "X"

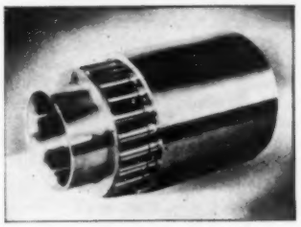
Fafnir Bearing Co., New Britain, Conn. (Vol.80,p.1057.)

The Type "X" duplex ball bearings for high-speed spindle application can be installed in one of three mounting arrangements—face-to-face, back-to-back, or in tandem. The unit consists of two matched single-roll bearings operated with the rings clamped tightly together. These bearings are of the continuous race-way design and are fitted with composition retainers. Nine sizes and capacities are available.

Roller Bearings, Industrial

Fafnir Bearing Co., New Britain, Conn. (Vol.80,p.899.)

A complete series of heavy-duty industrial roller bearings, made in a hundred sizes, is available. Rated capacities range from 10,000 to 500,000 lb. to cope with severe service requirements of heavy metal-working machinery. Rollers of



¾, 1¼ and 1½ in. diameter have been used in addition to the 1⅞ in. diameter previously available. Eighteen different bores are offered. Rollers are held in place by spacer bars instead of rivets through the rolls themselves.

Housing Mountings, Ball-bearing

Ahlberg Bearing Co., 321 E. 29th St., Chicago, Ill. (Vol.80, p.902.)

An economical means of securing an anti-friction bearing mounting, the CJB-Simplex machine units are designed for use where the bearing housing is either a part of the machine or must conform to the manu-

facturer's design. Three capacities are available for a given shaft size. All are equipped with self-aligning ball bearings. Units are available to fit shaft diameters ranging from ⅝ to 3½ in.

Grease Fittings, Drive-Type

Alemite Div., of Stewart-Warner Corp., 1826 Diversey Parkway, Chicago, Ill. (Vol. 80,p.1096.)

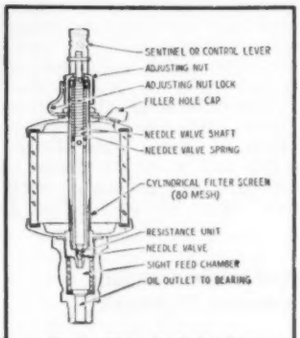
Tapping operations are unnecessary when these threaded drive fittings are used for high-pressure lubrication systems. These fittings make their own threads when driven into ⅜-in. holes. Original application is accomplished with special drive tools. Four types are available. All are cyanide hardened so

that they can be applied to steel or other metal parts of 42 to 48 Rockwell hardness or less.

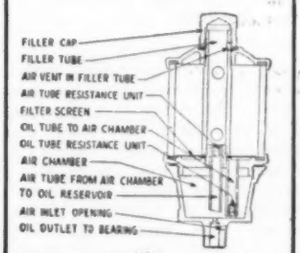
Oil Cups, Alemite

Alemite Division, Stewart-Warner Corp., 1826 Diversey Parkway, Chicago, Ill. (Vol. 80,p.319.)

The Alemite "Thermatic" oil cup operates by air expansion due to normal temperature rise in the running bearing. A rise of 1.8° F. starts a slow flow of oil. Daily fluctuation of room temperatures keep bearings of idle machinery lubricated with no overflow. There



Alemite "Microflow" Oil Cup



Alemite "Thermatic" Oil Cup

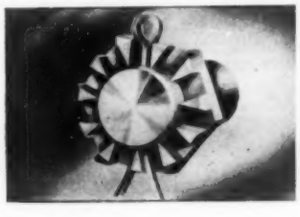
are no moving parts in the cup. An 80-mesh screen at the bottom of the reservoir filters out foreign matter.

The "Microflow" cup is adapted to bearings which require a continuous flow of oil in small, adjustable quantities. It is fitted with a resistance unit, which permits a fine adjustment of oil flow and assures positive operation by preventing clogging.

Nut, Slotted, "Micro"

Blatchford Corp., 80 E. Jackson Blvd., Chicago, Ill. (Vol.80,p.532.)

The Cooke "Micro Slotted" nut offers from 10 to 22 adjustments per turn, depending on size, instead of the usual 6

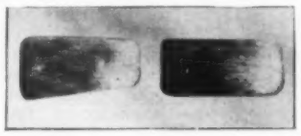


per turn. This adjustment is achieved by locating the keying wedges off center.

Spring, Die

Danly Machine Specialties, Inc., 2104-2130 S. 52nd Ave., Chicago, Ill. (Vol.80,p.673.)

The spring is coiled from keystone wire which, when coiled, assumes a rectangular cross section, developing the



full strength of the wire, increasing flexibility, travel and fatigue life. A spring steel wire of special alloy is employed.

Vibration Insulation

B. F. Goodrich Co., Akron, Ohio. (Vol.80,p.939.)

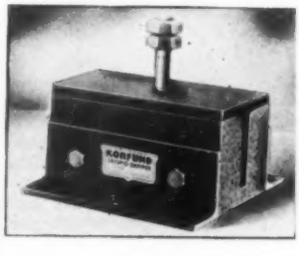
This standard line of vibration-damping rubber-to-metal mountings, known as "Vibro-Insulators," is designed for bases of machines, electric and combustion motors, generators, vibrating screens and reciprocating mechanisms. There are three types: Type No. 1 for

maximum load capacity of 800 lb., and a minimum frequency of 800 vibrations per min.; Type No. 2 for maximum load of 200 lb. and a minimum frequency of 1,200 vibrations per min.; and Type No. 10, which is of the double-shear type, for loads from 50 to 3,000 lb., and a minimum of 1,000 vibrations per min.

Vibration Insulation, "Seismo-Damper"

Korfund Co., 48-15 Thirty Second Place, Long Island City. N. Y. (Vol.80,p.177.)

Vibration isolation for medium and light machinery is the function of the Type T "Seismo-Damper." This device is built in sizes from 100 to 2,500 lb. capacity.



Processes and Supplies

Bonderite "Z" Process

Parker Rust-Proof Co., 2174 East Milwaukee Ave., Detroit, Mich. (Vol.80,p.778.)

Bonderite "Z" has been developed to prevent corrosion and stabilize paint finishes on zinc-alloy die castings and galvanized and galvanealed iron. It is a chemical conversion process that both coats and converts the surface of the metal. It produces an absorbent, paint-holding, crystalline structure on the surface and also an insoluble phosphate salt coating that becomes an integral part of the metal itself.

Casehardening Process, "Ni-Carbing"

American Gas Furnace Co., Elizabeth, N. J. (Vol.80,p.898.)

By heat-treating steel in a gas atmosphere consisting essentially of carbon-rich gas and ammonia, a thin, hard case is quickly obtained. This process is termed "Ni-Carbing."

The procedure is a combination of nitriding and carburizing. The exact gas mixture, temperatures employed, time cycle and choice of equipment can be varied according to surface and production requirements. Composition of the steel to be treated, also the size and shape of the parts influence the procedure specifications.

Plating Process, Tungsten

Tungsten Electrodeposit Corp., Barr Bldg., Washington, D. C. (Vol.80,p.898.)

License agreements are being negotiated for application of a process for depositing tungsten electrolytically. The deposit can be employed, for protection against corrosion, erosion and abrasion in dies, tools, and machinery of all kinds. Standard nickel plating equipment is said to be adaptable to the process and it is not technically difficult to apply.

Plating Process, Bright Zinc

Hanson-Van Winkle-Munning Co., Matawan, N. J. (Vol.80, p.66.)

The "Mazic" process of bright zinc plating permits heavy deposits from a cyanide solution and gives satisfactory results in still tank, semi-automatic and full-automatic plating systems. The plate is claimed to be truly bright, and to compare favorably with the best cadmium finishes. Only Mazic anodes, made from a special alloy, can be used in the solution.

Plating Process, "Wite-Brass"

Alrose Chemical Co., Providence, R. I. (Vol.80,p.1095.)

"Wite-Brass" is an alloy plate of three metals that is claimed to be easier to maintain than an ordinary brass plating solution. It is inexpensive to install and simple to control. The steel tank that holds the solution also serves as the plating anode. No afterbuffing of plated work is required and a mirror finish is obtained on polished work when plated for as long as 2 hr.

Protective Coating Process, "Cronak"

New Jersey Zinc Co., 160 Front St., New York, N. Y. (Vol.80,p.1058.)

The "Cronak" process produces a dichromate-film metal protective coating for zinc surfaces. By using this process, it is possible to eliminate the formation of bulky corrosion products on zinc and zinc-coated parts and to reduce the actual rate of corrosion of the metal. The process involves only a simple immersion treatment.

Air Hose, "Tower"

Republic Rubber Co., Youngstown, Ohio. (Vol.80,p.255.)

"Tower" oil-resisting pneumatic hose has been developed to combat high pressures, heat and oil under heavy service. There are six sizes, from ⅜ to 1½ in. The ⅜- and ½-in. sizes come in either 2- or 3-ply styles, and the larger hose in 3-ply.

Air Hose, "Hipress"

B. F. Goodrich Co., Akron, Ohio. (Vol.80,p.675.)

Three sizes, ½, ¾ and 1 in. diameter, are available in "Hipress" air hose, made in lengths up to 500 ft. This product, designed for all types of air tool applications, has an inner carcass of four plies of specially woven duck. The outer carcass is a tight braid of high tensile cords. Between the outer and inner carcasses is an insulation which serves as a secondary tube to seal off penetration of air through the walls of the hose.

Air Hose, Sterling

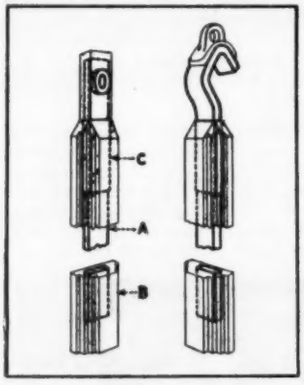
New York Belting & Packing Co., Passaic, N. J. (Vol. 80,p.351.)

This "Sterling Cord" is built like a tire, with the cords laid in tough rubber cushions and isolated from adjacent plies. Chief among the advantages claimed are lighter weight, more flexibility and greater resistance to pressure. The compounded cover shows resistance to bruises and abrasions. Oil-resistant rubber is used.

Anode, Chrome Plating, Parallel-Step

Crown Rheostat & Supply Co., 1910 Maypole Ave., Chicago, Ill. (Vol.80,p.1090.)

This chrome-plating anode features a copper core for uniform current distribution and a stepped lead surface that is self cleaning and will not burn off at the solution line. It is claimed that the thickness of plate deposited is uniform for the entire length of the anode.



Brazing Alloy, "Phos-Copper"

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. (Vol.80,p.779.)

Refinements in "Phos-Copper" brazing alloy include annealing and pickling to insure freedom of any carbonaceous deposit on the surface which might interfere with the production of leak-proof joints such as for refrigerator parts and radiators where such joints are necessary. It is an alloy of phosphorus and copper developed to replace expensive silver solders, and has a relatively low melting point, high tensile strength and excellent penetration.

This material is available in rod, ribbon, washers, strip and other shapes. Melting point is 707 C.

Brightening Agent, Zinc Plating

The R & H Chemicals Dept., E. I. duPont de Nemours & Co., Inc., Wilmington, Del. (Vol.80,p.1059.)

An improved brightening agent is available for use with the duPont bright-zinc barrel-plating process. The agent is now introduced into the plating solution instead of being used in a separate bath. Shallow or deep recesses can be given the same luster as high lights.

Cutting Oil

Sulflo Corp. of America, 701 Spring St., Elizabeth, N. J. (Vol.80,p.284.)

Recent improvements in "Sulflo" are said to have increased the effectiveness of this cutting lubricant. Chief characteristic of this product is that it contains a stable suspension of finely divided sulphur; tests show that this permits higher cutting speeds and heavier feeds. It is claimed for "Sulflo" that the viscous molten sulphur supplies fluid film lubrication in addition to the chemical contamination film effect found in sulphurized oils.

Enamels for Die Castings

Maas & Waldstein Co., Newark, N. J. (Vol.80,p.712.)

A line of air-drying lacquer enamels designed for finishing zinc and aluminum die castings has been placed on the market. These finishes adhere tenaciously and continuously to zinc and produce a durable elastic finish with one coat.

Enamel, Anti-Corrosion

Maas and Waldstein Co., Newark, N. J. (Vol.80,p.780.)

A line of air drying enamels has been especially designed to prevent corrosion of iron and steel in industrial service. These anti-corrosive enamels are made of rust inhibiting pigments and a synthetic resin, and form a hard, tough coating.

Fabric Finish, Fireproof

William E. Hooper & Sons Co., Philadelphia, Pa. (Vol. 80,p.976.)

"Fire Chief" cotton duck finish is available both as a treated fabric and as a finishing compound. Cotton duck, when treated with this compound, will not ignite, even when exposed directly to fire.

This material will have many uses in fireproofing welding- and paint-booth curtains and for machinery and merchandise covers.

Grinding Oil and Paste, Soluble

E. F. Houghton & Co., 240 West Somerset St., Philadelphia, Pa. (Vol.80,p.320.)

A soluble grinding oil and paste has been especially developed for use with the latest type of high-production precision grinding machinery. Houghton's soluble grinding oil protects and cools both work and wheel. The rapid release of abrasives and metal from the solution improves finish and reduces the spoilage that results from glazed or "loaded" wheels.

Hardening Preventative, "Kwik-Cote"

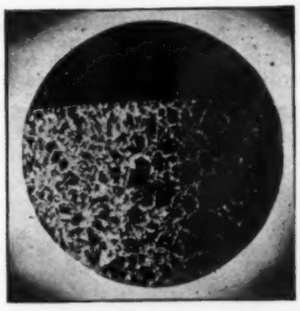
Grapho Products, Inc., 2232 Alvord St., Indianapolis, Ind. (Vol.80,p.526.)

"Kwik-Cote," a copper-plate solution, was developed to lower the cost of plating where selective hardness is necessary. It is a chemical compound which deposits a copper plating on the part treated by dipping or painting. Hair-line separation of hardness can be secured, and the results are positive. It is for "pack hardening" only, and is not recommended for liquid or gas furnace hardening.

Hardening Preventative, "K-Seal"

Lindberg Engineering Co., 221 Union Park Court, Chicago, Ill. (Vol.80,p.674.)

"K-Seal" is a coating material for application to steel before carburizing to prevent carbon penetration. This material is supplied in the form of a powder and a liquid which are mixed in definite proportions and applied to surfaces on which carburization is to be prevented. These surfaces must be free from oil. The material adheres tightly and very sharp boundaries can be obtained.



Hardening Salts, "Hy-Speed Case"

A. F. Holden Co., New Haven, Conn. (Vol.80,p.1060.)

"Hy-Speed Case" is a combination of pure salts for the heat-treatment of high-speed steel. A balanced case is obtained which includes some carburizing effects along with a sufficient amount of nitride needles. Maximum hardness with minimum brittleness is claimed. Melting point is 700 to 720 F., and the hardening range for secondary heat-treatment is 900 to 1,100 F. Tools to be put through this process must be hardened, tempered and ground to size as a secondary grinding operation would remove the shallow depth of case which this treatment provides.

Inhibitor, Pickling, "Acitrol 100"

E. F. Houghton & Co., 240 W. Somerset St., Philadelphia, Pa. (Vol.80,p.1057.)

"Acitrol 100" is a pickling inhibitor that is efficient at all pickling ranges and resists heat and time exposures. It dissolves readily in either strong or weak acid solutions and leaves no greasy residue or stain on the steel.

Joint Breaker, "Pen-A-Trate"

Grapho Products, Inc., 2232 Alvord St., Indianapolis, Ind. (Vol.80,p.530.)

"Pen-A-Trate" breaks the most obstinate joints, no matter how rusted or corroded. The product is a quick-creeping, quick-acting fluid that penetrates into the threads or between the faces of the joint to be broken.

Lubricating Oils

Standard Oil Co. of Indiana, 910 S. Michigan Ave., Chicago, Ill. (Vol.80,p.391.)

"Stanoil," in six grades, will replace many of the company's present brands because the series possesses qualities necessary to replace hundreds of brands of special oils now in use. The oils are claimed to have unusually high stability, excellent demusibility and low carbon-forming tendencies.

"Metal-Bord"

American Nickeloid Co., Peru, Ill. (Vol.80,p.638.)

"Metal-Bord" is a composite material of light weight made by adhering thin sheets of prefinished metal to cardboard or other backing material. Any thickness of metal can be used, and it can be mounted on any type or thickness of backing. The material can be fabricated by shallow stamping, and parts will undergo moderate forming. This material can be supplied in bright, satin, alternating bright and satin stripe, crimped or corrugated finishes.

Monel Tubing Joints

International Nickel Co., Inc., 67 Wall St., New York, N. Y. (Vol.80,p.896.)

Instead of flaring the Monel tube, a flange with a neck is pressed out of sheet stock, then a malleable-iron backing flange is slipped on the tube and the Monel flange is welded at the neck onto the tube. When a joint is bolted together, the iron backing on both sections serves to compress the welded Monel flanges, flattening them against intermediate gaskets and making them pressure tight.

Paint, "Coppercote"

American Coppercote, Inc., 480 Lexington Ave., New York, N. Y. (Vol.80,p.936.)

Marketed under the trade name "Coppercote," this material consists of pure metallic copper of dendritic form in a suitable vehicle. Applied to a surface of ferrous metal, it will prevent corrosion. It will not crack, chip or scale as a result of the extremes of temperature.

Protective Film, "Protex 2A"

Park Sales Co., 3 Park Place, New York, N. Y. (Vol. 80,p.1056.)

"Protex 2A" is a liquid protective film for metal surfaces. It can be applied to any article to protect it from scratches during manufacturing and packing operations and during storage and shipping. It is applied with a brush and dries in a few minutes. Removal is accomplished by moistening the surface slightly and then peeling off the transparent film. It is available in blue and red.

Soldering Flux, Non-Corrosive

Mico Instrument Corp., 10 Arrow St., Cambridge, Mass. (Vol.80,p.392.)

"Solderux," a non-corrosive soldering flux for soft-soldered joints, is nearly as active at soldering temperatures as highly corrosive zinc chloride, while at ordinary temperatures it is quite inert and does not corrode. Excellent joints on copper to copper, brass to brass, and iron to brass are easily made with no corrosion of joints.

Solvent, Degreasing

Curran Corporation, 114 Central St., Somerville, Mass. (Vol.80,p.598.)

A self-emulsifying solvent known as "Gunk" is available for degreasing machinery, automotive motors and chassis and other applications. "Gunk" makes a stable emulsion of oil and greases with cold water. After the oils and greases have been treated they may be removed by hosing with cold water.

Tubes, Calorized

Calorizing Co., Wilkinsburg Station, Pittsburgh, Pa., (Vol. 80,p.1089.)

Calorized 1½-per cent molybdenum tubes are said not to become brittle at any temperature and not to air harden appreciably. The high creep strength of these tubes make them adaptable to high temperature chemical applications and for use as conveyor rollers for furnaces under 1,400 F.

Safety Devices

Foot Guard, "Sankey"

Ellwood Safety Appliance Co., Ellwood City, Pa. (Vol. 80,p.904.)

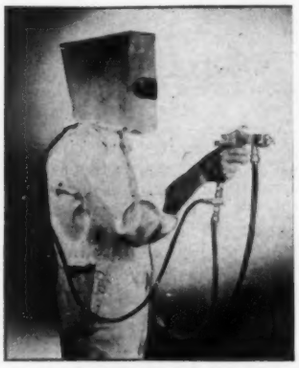
Built to withstand a 300-ft. lb. impact, the "Sankey" foot guard is easy to put on and take off, fits any shoe and cannot be kicked off. Three point contact gives perfect balance, snug fit and eliminates vibration. It is made either of strong aluminum alloy or galvanized steel, corrugated to resist impact.

It is fitted with silent tread, an adjustable cowhide strap and a quick spring fastener. Weight is 12 oz.

Respirator, Type MPH

DeVilbiss Co., Toledo, Ohio. (Vol.80,p.976.)

Designed for use in those occupations where there is fume or dust hazard beyond the protection offered by the more common type of respirator, the



Type MPH hood respirator covers the head and neck fully and provides complete protection against materials harmful to eyes, ears or respiratory organs.

Respirator, Dupor Plate, No. 24

H. F. Cover, Station "A," South Bend, Ind. (Vol.80, p.1060.)

The No. 24 Dupor Plate respirator is of the bulb-valve type and has a filter area of more than 44 sq.in. This respirator has the U.S. Bureau of

Mines approval No. BM-2111, for use in Type "A" pneuconiosis producing dusts. Vision is not obstructed by the filter pad.

Safety Goggle, No. F-3105

American Optical Co., Southbridge, Mass. (Vol.80,p.937.)

A recent addition to the line of eye-protection equipment is the No. F-3105 Ful-vue safety goggle. This goggle has all of the features of the regular Ful-Vue line plus side shields that provide additional protection against particles striking from any direction. These side screens are easily cleaned.

Safety Switch, Grinder

C. F. Burgess Laboratories, Inc., Freeport, Ill. (Vol.80, p.818.)

The goggle tray and "Micro Switch" illustrated has been used to enforce the use of goggles at grinding machines. The goggles are placed on the tray when not in use and their weight is sufficient to depress

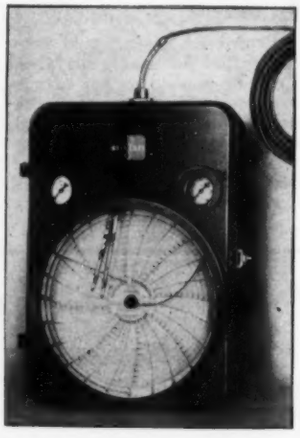
the actuating plunger of the sensitive switch. So long as the goggles remain in the tray the switch is held in an open position so that the motor will not start. When the operator removes the goggles the switch snaps closed.

Temperature and Time Control Equipment

Controllers, "Free-Vane"

Bristol Co., Waterbury, Conn. (Vol.80,p.740.)

For applications where a greatly reduced sensitivity (wide throttling range) is required, and the load conditions fluctuate over a wide range, this line of "Master" free-vane controllers is available for tem-

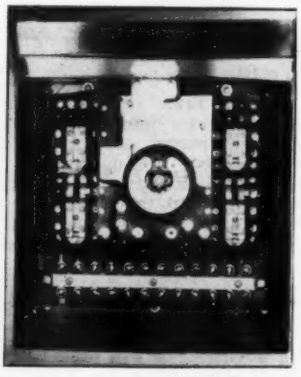


perature, time-temperature, flow, liquid level, pressure, time-pressure and humidity. They are of the pneumatic type and embody the basic free-vane system which is equipped with a sensitivity adjustment.

Controller, Furnace

Bristol Co., Waterbury, Conn. (Vol.80,p.830.)

The "Pyrotrol" instrument is designed primarily for use on



gas-fired industrial heaters used with ovens and furnaces. It protects against explosion as the result of pilot-light failure. This instrument also provides an automatic ignition sequence for lighting the heater so that it is necessary for the operator merely to push a button and leave the actual lighting-up process to the "Pyratrol."

Pressure Compensator

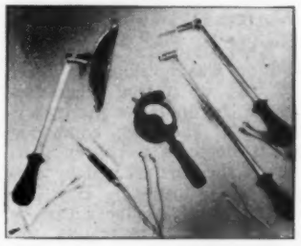
Foxboro Co., Foxboro, Mass. (Vol.80,p.604.)

Errors due to variations in static pressure are corrected in the measurement of flows of compressible fluids such as steam, air and gas, by means of this automatic pressure compensator. The device is merely a simple spiral pressure tube connected to a lever. As the line pressure changes, the spiral adjusts the multiplication of the linkage between the float and pen arm. The automatic pressure compensator will correct the position of the flow pen for a change in pressure as small as 1/10 of 1 per cent.

Pyrometers, Needle and Surface

Pyrometer Instrument Co., 103 Lafayette St., New York, N. Y. (Vol.80,p.319.)

A set of combination surface and needle pyrometers has been developed for industrial applications. By a quick interchange of various types of thermocouples, the instru-

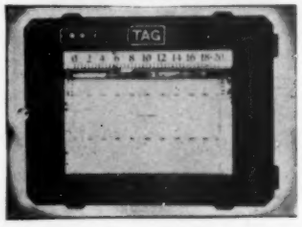


ment is transformed into four different types of surface and needle pyrometers. The indicator is equipped with a "Pyro" clamping device whereby contact and reading of actual temperatures no longer have to be made simultaneously, because the indicating needle will stay fixed at the correct temperature indication.

Pyrometer, Controlling, Recording

C. J. Tagliabue Mfg. Co., Park & Nostrand Aves., Brooklyn, N. Y. (Vol.80,p.831.)

An unusual photoelectric balancing method is used in the two- and three-position, recording-controlling pyrometer.

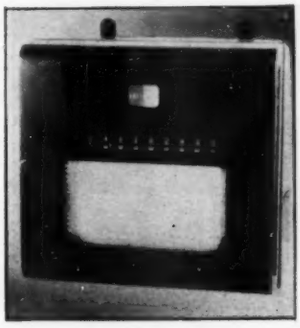


This method secures a simple instrument with few moving parts. Control action is independent of the chart drive and will continue to function despite power failure.

Pyrometer, "Wide Strip"

Bristol Co., Waterbury, Conn. (Vol.80,p.830.)

This wide strip pyrometer employs the potentiometer method, is fully automatic in



operation, is self-standardizing and is self-compensating for cold-junction temperature changes. It is offered as a single recorder, two-point continuous recorder, multiple recorder and recorder controller with ranges to 3,000 F. on a chart 12¼ in. wide.

Temperature Controllers, "Automatic"

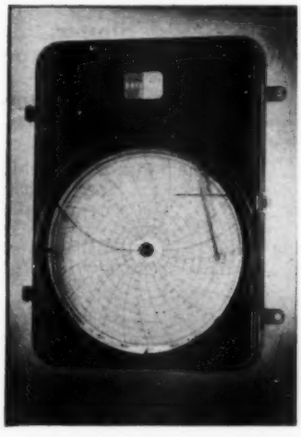
Automatic Temperature Control Co., 34 E. Logan St., Philadelphia, Pa. (Vol.80,p.220.)

A line of current-input controllers has been developed for electric furnaces, ovens and other heating units. The controllers have been designed to

hold temperatures of heating units close to the desired temperature curve. Four standard models have been produced to meet various requirements.

Pyrometer, "Pyromaster"

Bristol Co., Waterbury, Conn. (Vol.80,p.830.)

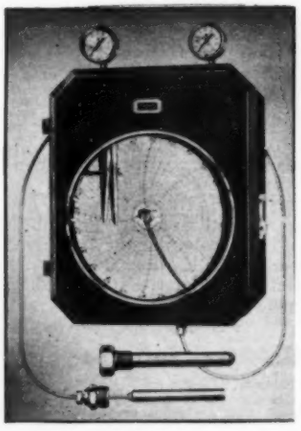


The "Pyromaster" is a highly accurate round-chart pyrometer operating on the potentiometer principle. It employs a pivoted galvanometer which closes a circuit first and then adds additional current to establish more rigidly the circuit already made. This instrument has no regular period, but acts instantaneously with every temperature change. It is housed in a 12-in. case and records on a 12-in. chart in ranges to 3,000 F.

Temperature Controllers, "Thermospeed"

Taylor Instrument Companies, Rochester, N. Y. (Vol. 80,p.256.)

A separable well-tube system for temperature measurement and control has been developed to overcome the usual delay or lag in transmitting a change of temperature to the

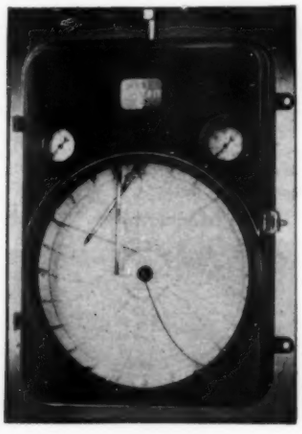


bulb. Dial or recording thermometers equipped with the "Thermospeed" system become more accurate in indicating every temperature variation, and assure closer regulation from controllers.

Temperature Controllers, "Ampliset"

Bristol Co., Waterbury, Conn. (Vol.80,p.568)

"Ampliset" free-vane controllers are a series of

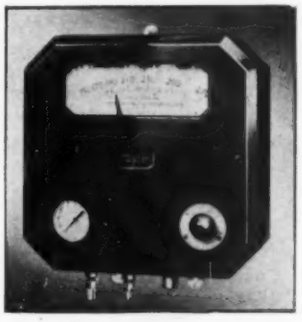


pneumatic-type equipment for automatically controlling temperature, time-temperature, flow, liquid level, pressure, time-pressure and humidity. The "Ampliset" principle has also been combined with the "Metameter," a system of telemetering recently developed for the remote control of steam pressure and gas pressure. It has great versatility, and is readily adaptable to meet unusual conditions.

Temperature Controllers, Indicating

Taylor Instrument Companies, Rochester, N. Y. (Vol.80, p.564.)

For close throttling control where a record of processing is not essential, this air-operated controller of the indicating type is available. Either high-range or full-range sensitivity

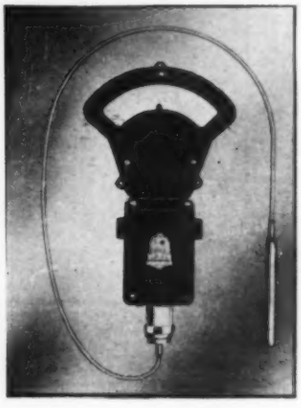


can be secured. The former is desirable for processes having small time lag; the latter for time lags of any magnitude. Many standard control ranges can be selected from within the limits of minus 100 and plus 1,200 F., or full vacuum and 3,000 lb. per sq.in. pressure.

Temperature Controllers

Partlow Corporation, New Hartford, N. Y. (Vol.80,p. 832.)

The Model "W" electric temperature control provides an accurate indication of temperature with automatic control for motor- or solenoid-operated valves, heating units and relays. The control utilizes a



mercury-actuated, flexible control element involving no lost motion.

Temperature Controllers, "Micromax"

Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia, Pa. (Vol.80,p.567.)

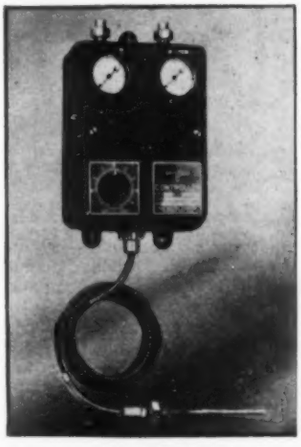
A control system for regulating input in proportion to demand has been developed for the "Micromax" instruments. This complete system has three integral parts, the Micromax

control instrument, the relay detector and the valve mechanism. Two self-balancing circuits, one for measuring the condition controlled, and the other for carrying out the control action are employed.

Temperature and Pressure Controller, Pneumatic-Type

Bristol Co., Waterbury Conn. (Vol.80,p.640.)

Many requirements for automatic temperature and pressure controls do not warrant a chart record or it may be that recording instruments are already in use. For such ap-

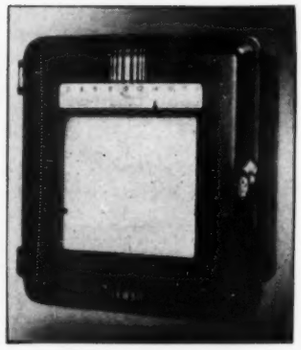


plications the Model 90 Controller has been developed. This instrument has a precision measuring element. It is equipped with a wide-range sensitivity adjustment.

Temperature Recorder, "Micromax"

Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia, Pa. (Vol.80,p.638.)

Not only are all combinations of indexing, recording, signaling and controlling combined in one instrument, but these func-

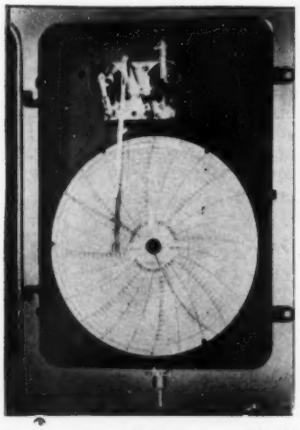


tions are measured in a convenient manner. A bold scale and pointer show the condition at the moment, and a clear record on 10 in. of strip-chart shows it for the past several hours. On controllers, a second pointer shows control setting.

Thermometer, Gas, Small Bulb

Bristol Co., Waterbury, Conn. (Vol.80,p.393.)

This accurate gas-filled recording thermometer, with a small temperature-sensitive bulb for long lengths of connecting tubing is offered for measuring



temperatures between —60 F. and 1,000 F., where tubing lengths as long as 100 ft. and more are required.

It is accurate under all conditions of temperature both along the tubing and in the case, responds quickly to rapidly fluctuating temperatures at the bulb, and records on a uniformly graduated chart. It is offered with one or two pens in the 12-in. chart size; and with one pen in the 8-in. chart size.

Thermometers, Industrial

Taylor Instrument Companies, Rochester, N. Y. (Vol.80,p.784.)

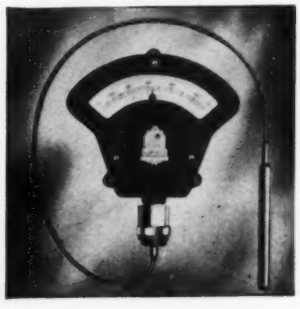
This thermometer tube, known as the "Binoc," gives more than twice the accustomed angle of vision and high magnification of the industrial thermometer's mercury column. It is readable with both eyes, is of

triple-lens construction and gathers three times as much light as other types, concentrating it behind the mercury column. Confusing empty-bore reflections are eliminated.

Thermometers, Dial

Partlow Corporation, New Hartford, N. Y. (Vol.80,p.832.)

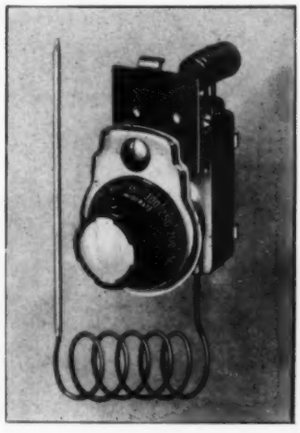
The Model WP dial thermometer has a 5-in. segment scale. A mercury-actuated flexible control element is used.



Thermostat, Hydraulic

Hart Mfg. Co., Hartford, Conn. (Vol.80,p.531.)

This hydraulic thermostat, designed for industrial heating equipment where accurate remote control of temperatures is desired, can be used for air or liquid temperature control as in electric ovens, dryers heaters and glue pots. The active element is small and compact, and can be easily mounted in the

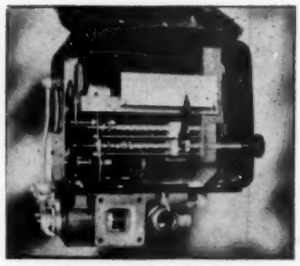


most convenient place. The control knob with temperature readings can be located in any convenient exterior part of the equipment. Temperature range 100 to 550 F.

Throttling Control, Furnaces

Lindberg Engineering Co., 221 Union Park Court, Chicago, Ill. (Vol.80,p.832.)

Accuracy and uniformity in furnace heating rates is secured with this throttling control. The instrument is fully automatic and is suitable for use on batch furnaces and other applications where a wide range of heat input is desired.



The throttling control unit consists of a standard proportioning valve driven by a reversible motor. The low-limit switch is fixed, while the upper limit switch is automatically adjusted by means of a small reversing motor operated by the contacts on the control instrument.

Tools, Hand

Files, Improved

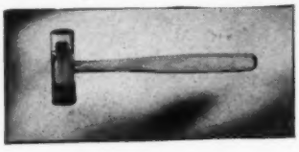
Nicholson File Co., Providence R. I. (Vol.80,p.67.)

An improved method of file manufacture and tooth construction is now used for the Nicholson, Black Diamond and McCaffrey brands. Regardless of the material, the improved files have demonstrated greater ability to remove stock and to remove it faster.

Hammer, Soft Face

Bonney Forge & Tool Works, Allentown, Pa. (Vol.80,p.1059.)

This line of soft face hammers has tips of a tough, amber-colored composition material that will not shatter, chip or break. In the event that the



tips become badly worn, the old tips can be removed and new tips pressed in place. These hammers are available in 1½-oz. ½-lb., and 1-lb. sizes.

Notching Tool, Sheet Metal

Whitney Metal Tool Co., 105 Mill St., Rockford, Ill. (Vol.80, p.1090.)

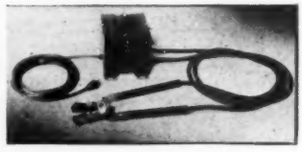
This hand-notching tool is

designed for cutting beaded corners, notching the edges of curved seams and similar work in fabricating sheet-metal parts. Dies are made of two pieces of hardened tool steel and clearance is provided so that punchings can drop through the dies. A depth gage is mounted on the right side of the die.

Pliers, Hot-Jaw

Ideal Commutator Dresser Co., 1439 Park Ave., Sycamore Ill. (Vol.80,p.532.)

This unit, called "Thermo-Grip," is an electric heating tool which takes the place of an open-flame blow torch or



burner. When plugged into any a.c. lighting circuit, current passes through the transformer and rapidly heats the jaws to a white-hot temperature. The unit weighs 14 lb.

Scraper and Slotter, Commutator, Hand-Type

Ideal Commutator Dresser Co., 1439 Park Ave., Sycamore Ill. (Vol.80,p.1060.)

The swiveling head of this hand-type slotter and scraper is circular in form and the opposite faces have interlocking notches. These notches permit locking the scraping bit at

any angle by tightening a lock screw. One end of the tool bit is ground for V-slots, the other for U-slots.

Soldering Irons

Stanley Rule & Level Plant, New Britain, Conn. (Vol.80, p.903.)

A line of electric soldering irons designed to operate efficiently on either a.c. or d.c. power is being marketed. These tools have compressed, pure copper tips machined for a valve-fit connection with the

heating heads, to assure effective heat conduction and to protect connecting surfaces from oxidation and flux corrosion. There are eight different sizes, ranging from 52 watts with a $\frac{1}{16}$ in. tip to 435 watts with a $1\frac{5}{16}$ in. tip.

Tape-Rule, Steel

Lufkin Rule Co., Saginaw, Mich. (Vol.80,p.281.)

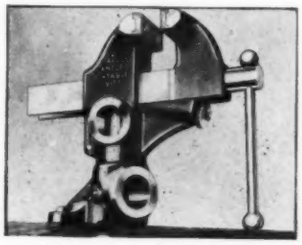
A 6-ft. steel tape, with a case having three flat edges to facilitate inside and outside measuring, is available. The box is 2 in. wide, and for inside measuring the square box is

butted against one side of the opening to be measured. When the tape is extended to the limit the user simply adds 2 in. to the reading. This "Mezurall" tape-rule comes with an end hook.

Vise, Bench, All-Angle

Police & Sportsman Supply Co., 349 S. Vermont Ave., Los Angeles, Calif. (Vol.80,p.971.)

This bench vise permits locking of the work at any angle. It is mounted on a tubular post which, in turn, is mounted in a base bolted to the workbench. The post can be used

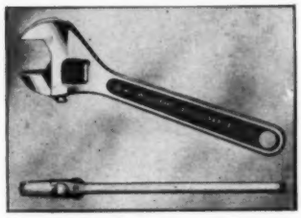


in either a vertical or horizontal position, and the vise can be used straight up or sideways in either position of the post. Two sizes are available, in either a woodworker or machinist model with removable hardened steel jaws $2\frac{1}{2}$ or $3\frac{1}{2}$ in. wide. Interchangeable jaws can be used.

Wrenches, Forged, Adjustable

J. H. Williams & Co., 75 Spring St., New York, N. Y. (Vol.80,p.938.)

Two lines of adjustable wrenches are now being manufactured. Design improvements include square shoulders on the movable-jaw shank to overcome wedging and spreading action.



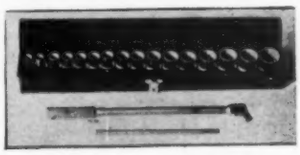
Both lines are available in 4, 6, 8, 10 and 12 in. sizes.

The "Adjustable" line wrenches are drop-forged from a special carbon steel. The "Superadjustable" wrenches are forged from chrome-alloy steel and are thin, light and strong.

Wrench Set, Socket

Bonney Forge & Tool Works, Allentown, Pa. (Vol.80,p.818.)

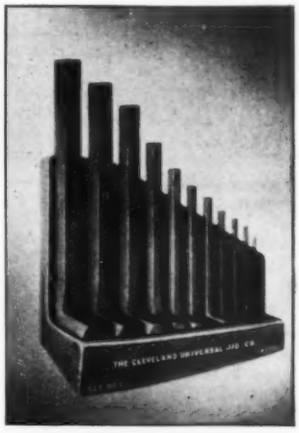
A set of sixteen sockets with double hexagon openings ranging from $\frac{7}{16}$ to $1\frac{1}{4}$ in. for $\frac{1}{2}$-in. square drive is included in the "D3" wrench set. A 15-in. hinged handle with cross handle is supplied. Made of Bonney "CV" chrome-vanadium steel, each socket can withstand severe use.



Wrench Holder

Cleveland Universal Jig Co. 13328 St. Clair Ave., Cleveland, Ohio. (Vol.80,p.320.)

A socket wrench holder of molded rubber composition base with a separate receptacle for each wrench is now available. These bases are made in two sizes. The larger size accom-



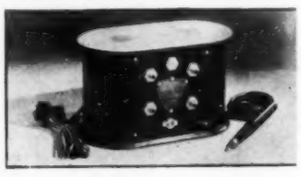
modates eleven wrenches from $\frac{3}{32}$ to $\frac{5}{8}$ in. across the flats. The smallest set, designed for toolmaker's use, accommodates eight wrenches, ranging in size from $\frac{3}{32}$- to $\frac{1}{2}$-in. across the flats.

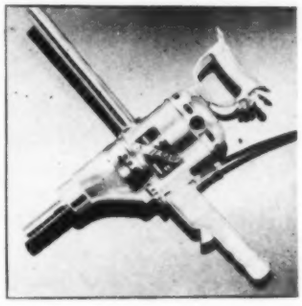
Tools, Portable

Demagnetizer and Etcher

Frampton Electrical Equipment Co., Norwood Bldg., Dayton, Ohio. (Vol.80,p.317.)

This combination demagnetizer and etcher is compact and light in weight. The etching pencil is equipped with a low electrical jack for metals of about 0.015 in. thickness; a medium size for about $\frac{1}{16}$ to $\frac{3}{8}$ in., and a high one for from $\frac{3}{8}$ in. to thickest piece. These three stages prevent burning thinner pieces. Weight 16 lb.





Drills, Electric

Skilsaw, Inc., 3310 Elston Ave., Chicago, Ill. (Vol.80,p.67.)

Five models have been added to the line of portable drills. Model 36 is a $\frac{1}{16}$-in. high-production, ball-bearing electric drill, and the Model 46 is a $\frac{1}{4}$-in. high-production drill. Model 103 is a $\frac{3}{8}$-in. heavy-duty, ball-bearing drill. The Model 123 is a $\frac{1}{2}$-in. heavy-duty drill and Model 143, illustrated, is a $\frac{1}{2}$-in. tool.

Drills, Electric

Skilsaw, Inc., 3310 Elston Ave., Chicago, Ill. (Vol.80, p.564.)

A special duty $\frac{1}{4}$-in. drill and two "Defender" $\frac{1}{4}$- and $\frac{1}{2}$-in. drills offering quality construction have been announced. The motor construction is identical

with that in the regular drills. Each model is fitted with a 3-jaw geared-chuck and key.

Drill, Electric

Signal Electric Mfg. Co., Menominee, Mich. (Vol.80, p.604.)

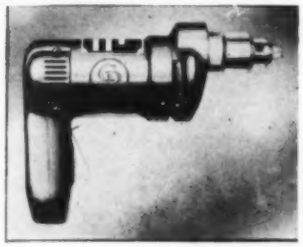
A standard-duty, $\frac{1}{4}$-in. portable electric drill, known as the improved OB-4 model, is now available. The switch is

in the handle, which is ventilated. An almond 3-jaw chuck with key and an 8-ft. rubber-covered cord and rubber plug are supplied.

Drill, Electric Light-Weight

Chicago Pneumatic Tool Co., 6 East 44th St., New York, N. Y. (Vol.80,p.674.)

This universal electric drill, $\frac{1}{16}$-in. capacity, is designed to fit the hand and is comfortable to hold. The overall, length is $7\frac{1}{16}$ in. and the weight is only 2 lb. 10 oz. The spindle offset is small and the weight is well balanced. A companion tool



is the universal electric screw driver and nut runner for driving up to No. 8 screws and ⅜-in. nuts. The overall length of this tool is 10⅝ in., and the weight is 3½ lb.

Drill, Electric, Light-Duty

Signal Electric Mfg. Co., Menominee, Mich. (Vol.80, p.1095.)

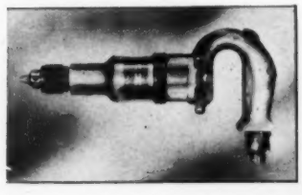
The Signal Model OB-8 light-duty, portable electric drill of ¼ in. capacity is designed for intermittent service. It is well

balanced, has an air-cooled handle and a trigger-type switch and is equipped with 8 ft. of rubber-covered cord. Weight is 7 lb., and speed at no-load is 2,950 r.p.m.

Drill, Pneumatic

Buckeye Portable Tool Co., Dayton, Ohio. (Vol.80,p.674.)

This Model O16—4 Hercules drill with a ¼ in. drilling capacity weighs only 4¼ lb. It can be operated entirely by one

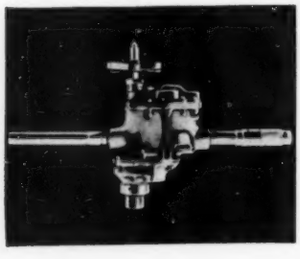


hand, a thumb lock throttle being conveniently placed. The air motor operates the chuck spindle through planetary gears. The tool is equipped with ball bearings throughout.

Drills, Pneumatic, Light-Weight

Rotor Air Tool Co., 5704 Carnegie Ave., Cleveland, Ohio. (Vol.80,p.603.)

The E-73 is rated at 300 r.p.m. and has a No. 3 Morse taper socket for 1¼ in. drilling and 1 in. reaming, whereas the Model E-72 is rated at 450 r.p.m. and has a No. 2 Morse taper

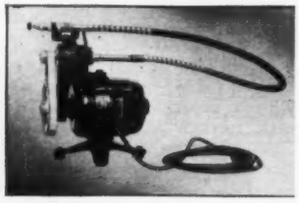


socket and is suitable for ⅝-in. drilling and ¾-in. reaming. The weight of the machine is only 22 lb.

Flexible-Shaft Machine

Mall Tool Co., South Chicago, Ill. (Vol.80,p.174.)

This ½-hp., continuous-duty, ball-bearing, countershaft-driven, flexible-shaft machine is equipped with speed combinations for any particular grind-

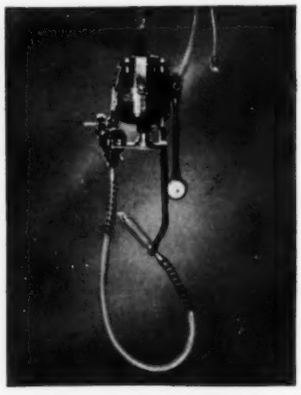


ing or cutting application. Speed variations from 850 to 14,000 r.p.m. may be secured. The machine may be fitted with rotary files or shaped grinding wheels.

Flexible-Shaft Machines

N. A. Strand Co., 5001 N. Lincoln St., Chicago, Ill. (Vol. 80,p.219.)

A line of vertical-type, three-speed, flexible-shaft machines has been announced. This type is made in ⅛-, ¼- and ½-hp. capacities, although larger units

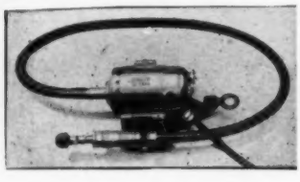


will be furnished. Speeds of 1,700, 3,000 and 5,200 r.p.m. or of 3,400, 6,000 and 10,400 r.p.m. are provided.

Grinder, Flexible-Shaft

Stanley Electric Tool Div., Stanley Works, New Britain, Conn. (Vol.80,p.281.)

A flexible shaft, portable grinder that develops 3 hp.

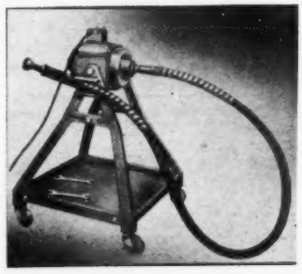


and a speed of 18,000 r.p.m. is now available. This grinder is designed for external and internal grinding operations on tools, dies and castings. The universal motor provides ample power to drive a 1½ x ½-in. wheel.

Flexible Shaft Machine

Swartz & White Mfg. Co., 215 Washington St., Binghamton, N. Y. (Vol.80,p.54.)

This multi-service flexible shaft outfit is offered for grinding, sanding, drilling, burnishing, polishing, reaming and



buffing on flat or irregular surfaces. The 6-ft. flexible shaft has a ball-bearing hand piece. The motor is of ⅓-hp. and the handpiece has a ¼-in. capacity.

Grinder, Flexible-Shaft

Charles L. Jarvis Co., Gildersleeve, Conn. (Vol.80,p.181.)

A ⅓-hp., 18,000-r.p.m. motor powers this flexible-shaft grinder. It is known as the "Speed-

witch." The handpiece is ball bearing and it can be used with ¼-in. collets. It takes grinding wheels up to and including 2 in.

"Hamerench," Pneumatic

Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill. (Vol.80,p.600.)

A pneumatic tool that combines the actions of a hammer and a wrench, this No. 603 "Hamerench" applies and removes all types of nuts. Being of the right-angle type and operating horizontally to the application, this machine works in places ordinarily inaccessible.

The number of impacts can be as high as 1,800 per min. Specifications: working space with socket, 7 in.; length of spindle without socket, 6⅜ in.; length, 22½ in.; weight 25 lb.; capacity, all nuts up to 1⅛ in. full size.

Grinders, Flexible-Shaft

Swartz & White Mfg. Co., 215 Washington St., Binghamton, N. Y. (Vol.80,p.1023.)

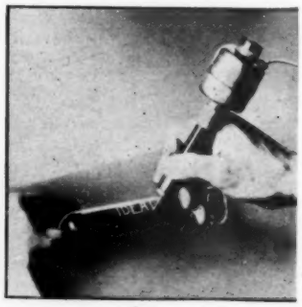
The Series 1500 and Series 4500 flexible-shaft grinders have been improved by adding a clamping bracket at the top of the stand. This makes pos-

sible rigid mounting of the wheelhead so that work can be brought to the wheel. These machines are available in five sizes, ranging from ¼ to 2 hp. Grinding wheel size ranges from 4x1x½ to 10x1x½-in.

Marker, Electric

Ideal Commutator Dresser Co., 1439 Park Ave., Sycamore, Ill. (Vol.80,p.639.)

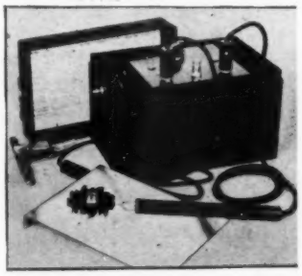
A portable electric tool that fits the hand is available for marking on practically any material irrespective of whether it is a metal or a non-conductor of electricity. This unit writes like a pencil and is 6¾ in. overall.



Metal Graver

Electro-Graphic Graver Co., Factories Bldg., Toledo, Ohio. (Vol.80,p.181.)

An electrically actuated tool for marking, lettering or engraving on metal is being marketed. The electrode, in an insulated stylus handle, has a

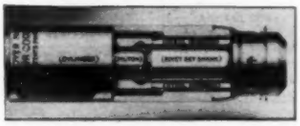


reciprocating motion which is actuated when the electrode comes in contact with the work, serving as a rapid interrupter of the current.

Riveting Hammers, Air-Cooled

Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y. (Vol.80,p.604.)

Air cooling through the use of exhaust air is now a feature of the Boyer riveting hammers. Four ports carry the cooling currents of exhaust air down the length of the cylinder to its nose end and out past the rivet-

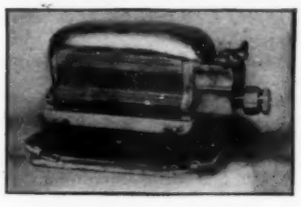


set head. Rivet-set breakage is reduced, more rivets can be driven before the set must be replaced, and the hammer can be used more continuously and nose-end wear in the cylinder is reduced.

Sander, "Speed-Bloc"

Sterling Products Co., Curtis Bldg., Detroit, Mich. (Vol.80, p.278.)

The "Speed-Bloc" sander has been made applicable to more curved, and to all flat, surfaces. It may be used on metal, fabric, wood, or composition. Full operation is accomplished with 50 to 60 lb. air pressure. The oscillating stroke of the pad is $\frac{3}{8}$ in., and the speed is 3,000 strokes per min. The unit is 7 in. long, $4\frac{3}{4}$ in. high, $3\frac{3}{4}$ in. wide and weighs $7\frac{1}{2}$ lb.



Sanders, Portable

Black & Decker Mfg. Co., Towson, Md. (Vol.80,p.176.)

The redesigned line of portable sanders are lighter in weight, but more powerful and dust- and grit-proof. With proper balancing and smaller sizes of the new design, fatigue of the operator is reduced. There are three 7-in. models and a 9-in. model.

Screw Driver, Electric

Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill. (Vol.80,p.353.)

This "Thor" U 16 electric driver has all weight concentrated right at operator's hand. The screw driver is $10\frac{1}{2}$ in. over-all, and can be used in places ordinarily inaccessible. It will drive all sizes of screws from No. 4 to No. 12.

Tools, Small

Arbor Spacers, "Laminated"

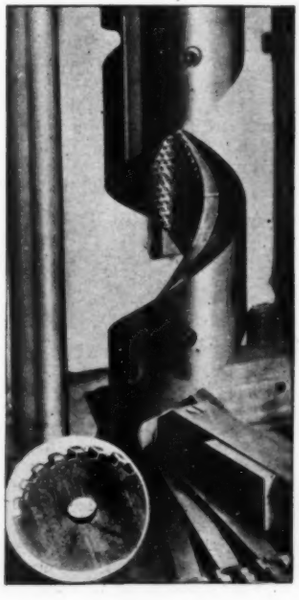
Laminated Shim Co., Long Island City, N. Y. (Vol.80, p.369.)

Arbor spacers, packed ten or twenty to an envelope, are available in eight different thicknesses from 0.001 to 0.020 in., and in six sizes.

Broach, Internal, Helical

Colonial Broach Co., Detroit, Mich. (Vol.80,p.1022.)

A novel internal helical broach for an external broaching operation was developed for cutting the teeth on worm-wheel sectors for a casement-window mechanism. The broach is made in sections that are mounted in the helical broach holder.

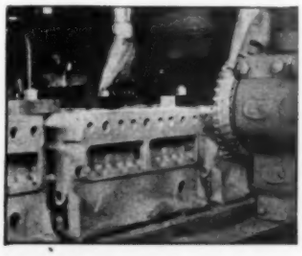


Two broaches, one having a right-hand and the other a left-hand lead, are mounted in a standard Colonial hydraulic broaching press provided with a helical-feed head. Three sectors are cut at each stroke by each broach, production being at the rate of 200 pieces per hour.

Cutting Alloy, "Crobalt"

Michigan Tool Co., Detroit, Mich. (Vol.80,p.784.)

"Crobalt" is a cutting alloy for low-cost high-speed cutting of cast iron, although it has been successfully applied to the cutting of steel. Cutting speeds up to three times those conventionally used with high-speed steels have been found to

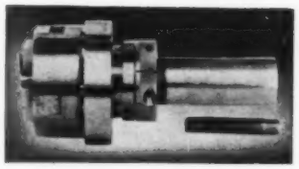


represent a good average in the cutting of cast irons with tools tipped with this alloy. "Crobalt" is adapted to roughing and semi-finishing operations in turning and boring work, but it is not recommended where extremely high polished surfaces are required.

Diehead, Pipe, Insert-Chaser

Eastern Machine Screw Corp., Truman & Barclay Sts., New Haven, Conn. (Vol.80,p.181.)

The chasers recede at a definite rate until the proper length

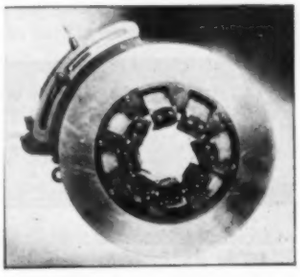


of thread is cut, then the diehead opens, withdrawing the chasers. Positive action of the diehead governs the actual taper, holding pipe threads to the specifications prescribed.

Dieheads, Pipe, Stationary

Landis Machine Co., Inc., Waynesboro, Pa. (Vol.80, p.901.)

Standard model is for standard pipe threads and the heavier model for oil-country tubular goods. The first has a capacity from 4 to 10 in., and the second from $4\frac{1}{2}$ to $10\frac{3}{4}$ in. O.D. threads.



The dieheads are manually operated and are locked when closed. They have universal adjustment for size.

Dieheads, Self-Opening

Geometric Tool Company, New Haven, Conn. (Vol.80, p.1054.)

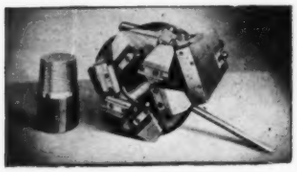
Style C self-opening dieheads have been redesigned so that it is now possible to convert one series of tools from an inside-trip diehead to an outside-trip

type, or vice versa. Twenty-three sizes and types of these tools are carried in stock, with a cutting range from $\frac{3}{8}$ to 6 in., inclusive.

Diehead, Special

Landis Machine Co., Inc., Waynesboro, Pa. (Vol.80,p.00.)

A special heavy-duty Landmatic die head is available for large diameter, steep taper and

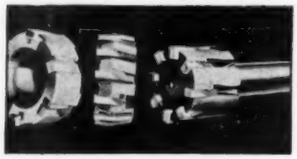


coarse pitch threading. This tool was originally designed for cutting 6-in. O.D. thread, four pitch, 2 in. taper per foot and 5 in. length of thread, but can be adapted for cutting other diameters, tapers and thread lengths. It is adapted for use on a heavy-duty turret lathe.

Drills, Core, and Reamers, "Ray-Blade"

Ingersoll Milling Machine Co., Douglas & Willoughby Sts., Rockford, Ill. (Vol.80, p.1057.)

The double-tapered Ray-type blade has been applied to core drills and reamers made either of the shell type or with a solid shank. These blades are



positively locked against the thrust of the boring cut. When worn, they are easily reset any amount. Locking is accomplished with a compensating, serrated wedge.

Drills, Flat, Small Diameter

Grobet File Corp., of America, 3 Park Place, New York, N. Y. (Vol.80,p.5.)

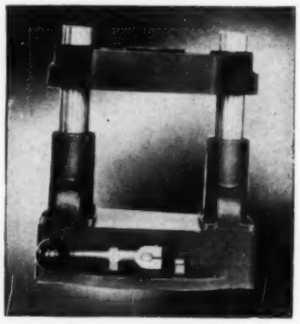
A line of small flat drills made from high-speed steel is now available in diameters ranging from 0.002 to 0.100 in. These drills are guaranteed to be accurate as to dimension and to be accurately centered.

These drills are particularly adaptable for drilling injection nozzle inserts and similar small parts.

Drill Jigs

Esco Engineering Service Co., 1922 Linwood Ave., Toledo, Ohio. (Vol.80,p.180.)

Six new styles in 40 sizes have been added to this line of drill jigs. The locking mechanism of double eccentric gears is fitted under each guide post, increasing work holding pres-



sures without increasing jig operating pressures. Over-all dimensions have been reduced without corresponding reductions in work areas.

Grinding Wheel, Finishing-Type

Manhattan Rubber Mfg. Div., Raybestos-Manhattan, Inc., Passaic, N. J. (Vol.80,p.838.)

This finishing wheel is relatively firm but not rigid like the usual grinding wheel. It is not, however, soft enough to conform to irregular shapes like the usual cloth polishing wheels. This wheel is particularly suitable for finishing operations on stainless steel and is also being used on taps, twist drills and work of similar nature.

Grinding Wheel, "B-E" Bond

Norton Co., Worcester, Mass. (Vol.80,p.895.)

The "B-E" bond wheel for tool grinding is an improved form of the "B" bond wheel introduced several years ago. The "B-E" wheel has a uniform, stable composition, and

tests have shown that it has a cool free-cutting action. This is accomplished without sacrificing wheel life. The wheel's features point to application on surface, centerless and other grinding operations. Used with Alundum abrasive the wheel has a blue-gray color, with 38 Alundum it has the white color that is a characteristic of the "B" bond.

Hacksaw Blade, Molybdenum-Steel

L. S. Starrett Co., Athol, Mass. (Vol.80,p.392.)

The "S-M" hacksaw blade, of hard, long-wearing molybdenum steel, may be used for fast, economical cutting on nickel, monel metal or stainless steel alloys, high-speed, manganese and similar hard alloys, and will cut solids, angles, channels, pipe and rails. Blades are made in 10 and 12 in. lengths and 14, 18, 24 and 32 teeth per in. sizes for hand frames. Power blade sizes are 12, 14, 17, 18, 21 and 24 in. long and have 4, 6, 10 and 14 teeth per in.

Hacksaw Blades, "Nu-Mol"

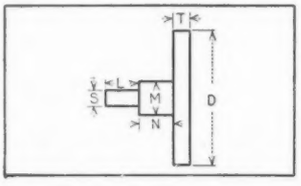
Henry Disston & Sons, Philadelphia, Pa. (Vol.80,p.530.)

"Nu-Mol" hacksaw blades are general-purpose blades. For applications where carbon and molybdenum blades have been used, "Nu-Mol" is said to be tougher, stronger, more productive and economical.

Laps, Diamond

Mico Instrument Co., 10 Arrow St., Cambridge, Mass. (Vol. 89,p.640.)

Permanently charged diamond laps for working hard materials, including carbide tools, are now available. These laps run true about the shoulders S and M and the face only is charged. The dimen-



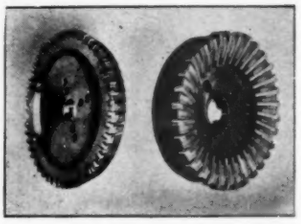
sions have been chosen to cover a wide range of uses. Two sizes of diamond grit are used in charging these laps. The coarser is intended for quite rapid cutting, while a much finer abrasive is used for fine grinding or finishing. Water is used as a cutting fluid.

D	*M*	*N*	*S*	*L*	*T*	Speed
½"	3/16"	3/8"	..	..	3/16"	5,000
1"	3/8"	½"	5/16"	½"	¼"	4,500
2"	½"	½"	5/16"	3/4"	5/16"	4,000
4"	⅝"	1"	½"	1"	½"	2,000

Milling Cutter, Face

Ingersoll Milling Machine Co., Rockford, Ill. (Vol.80, p.601.)

When roughing, the wear on the cutter blade is mostly on the diameter of the cutter; when finishing, the wear is mostly on the face. The "Ray-Blade" is a universal face milling cutter blade. It is made to

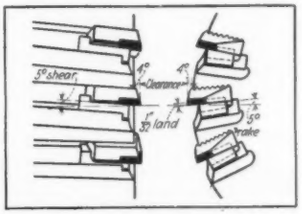


lie along the radial face of roughing cutters or along the conical diameter of finishing cutters. It is radially adjusted to compensate for the diametrical wear in roughing cutters, and axially adjusted in finishing cutters.

Milling Cutters, Cemented-Carbide

Ingersoll Milling Machine Co., Rockford, Ill. (Vol.80, p.283.)

A "Zee-Lock" milling cutter has been developed to meet the exacting requirements of cemented carbide. The cutter blade is tipped with cemented carbide and inserted into a forged and case-hardened alloy-steel cutter body. The Z-shaped wedge securely retains the ser-



rated cutter blade in the cutter housing. The wedge hooks the back of the blade and the front of the cutter body, preventing the blade from shifting backwards or inwards from the cut.

Milling Cutter, Hollow, "Zee-Lock"

Ingersoll Milling Machine Co., Rockford, Ill. (Vol.80, p.177.)

Rigidly held, adjustable, hollow-mill blades which may be renewed at only a fraction of the cost of the complete cutter are provided by the adjustable "Zee-Lock" hollow

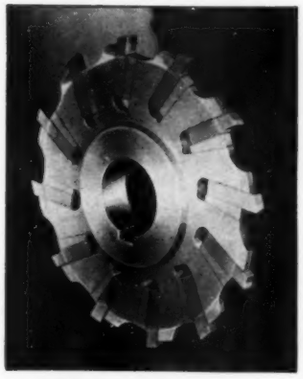
mill. The cutter blade is positively locked, adjustable in two directions and is complete in itself. It is fitted into a forged and heat-treated alloy steel housing.

This design maintains accurate size with a minimum of grinding after setting blades.

Milling Cutter, Keyway

Ingersoll Milling Machine Co., Rockford, Ill. (Vol.80, p.389.)

A "Tri-Lock" cutter blade has been developed for narrow keyway or slotting operations. Three sets of serrations are incorporated in the blade and wedge, each of which permits individual adjustment of a member. Cutters as small as $\frac{5}{16}$ in. wide can be manufactured. The width or diameter is easily maintained by the triple-serrated blade lock. Two direction blade adjustment is permitted by the horizontal and vertical serrations on the blade faces.



Numbering Stamp, Interchangeable Type

Numberall Stamp & Tool Co. 379 Huguenot Ave., Huguenot Park, Staten Island, N. Y. (Vol.80,p.178.)

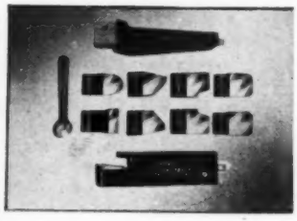
Quick changes of type, secured by pressure of the operator's thumb, makes this numbering stamp convenient for consecutive stamping of metal parts requiring many changes. The "Numberall" interchangeable type holder is furnished both in hand and press styles.

The holder is furnished in all practical sizes. Different sizes of characters engraved on the same body can be used in the holder.

Planer Tools, Frog and Switch Rails

Apex Tool & Cutter Co., Shelton, Conn. (Vol.80,p.71.)

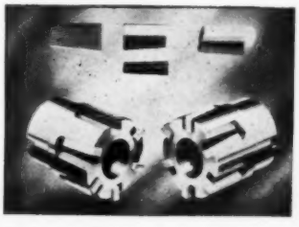
An inserted tool has been developed for planing frog and switch rails and crossovers. The holder is made with a hardened seat having milled serrations which mate with serrations on the bottom of the toolbits. When the toolbit is placed in the holder it is locked by means of a double-acting, draw-bolt screw. All toolbits are ground with 10 deg. front rake and 2-deg. side and bottom clearance and are made either of high-speed or cobalt high-speed steel.



Reamers, Serrated

Kelly Reamer Co., Cleveland, Ohio. (Vol.80,p.712.)

Only three components are used in these serrated tools. These parts are the body, the blades and the wedges. The body is made of alloy steel, carburized, hardened and drawn, and the blades may be supplied in cobalt high-speed steel, Stellite J metal, or cemented-carbide types. The wedges are heat-treated alloy steel. The serrated tools are made in taper-hole roughing and finishing reamers, straight-hole roughing and finishing reamers, and straight-shank roughing and finishing chucking-type reamers.



Reamer, Short, Refill-Type

Packard Motor Car Co., Detroit, Mich. (Vol.80,p.706.)

A reamer, said to be radically different from any heretofore used commercially, is being successfully employed in connection with a number of reaming operations in the company's plant at Detroit. The reamer, with only a fraction of the length of the cutting edge found on standard reamers, is doing precision work four times as long as old-type reamers before resharpening. When the cutting part is no longer usable, it can be detached from the mandrel and thrown away.

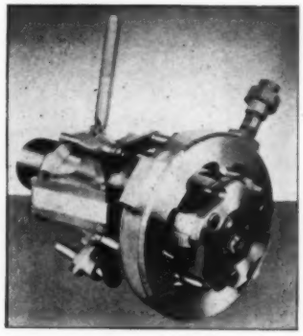
In feeding into work, it is claimed that the old-type reamer does not do a cutting job throughout its entire length. Only that portion of the tool which first comes into contact with the metal to be machined actually cuts; the remainder of the cutting edge is dragged through the hole without accomplishing anything more.

It has also been found that the edge of the reamer which feeds into the metal does not have to be beveled. On the contrary, much better results are obtained with a straight-edge reamer.

Tap, Collapsible

Landis Machine Co., Waynesboro, Pa. (Vol.80,p.33.)

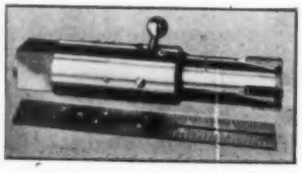
This oiling-type trip ring for collapsible taps replaces the conventional type ring when tapping long threads of large diameter in steel and it is essential to maintain an ample supply of lubricant to dissipate heat and wash away chips. The accompanying illustration shows one of these rings applied to a 6-in. Style LM receding chaser collapsible tap. The ring consists of a hollow housing with steel plates mounted on the front and the back, thus forming a reservoir for the lubricant.



Tap, Collapsible

Landis Machine Co., Waynesboro, Pa. (Vol.80,p.390.)

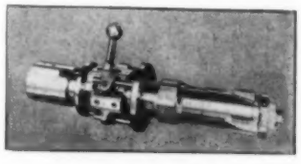
An improved, collapsible, hand sizing tap has been added to the Landis line of machine taps. This tap, designed primarily as a hand sizing tap to take the place of the solid adjustable tap ordinarily used, offers the advantage of instant withdrawal from the work without requiring to be backed out. Any length of shank or tap can be supplied. The tap is provided with a diametral adjustment of approximately $\frac{1}{32}$ in. both over and under the nominal chaser size, a total of $\frac{1}{16}$ in. The tap can be furnished in all sizes from $1\frac{1}{8}$ to 12 in. inclusive.



Tap, Collapsible, With Pilots

Landis Machine Co., Waynesboro, Pa. (Vol.80,p.600.)

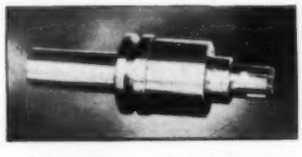
A collapsible tap, with pilots to insure concentricity of the thread being tapped with other parts of the casting, is now being marketed. The illustration shows such pilots applied to a Style LT collapsible tap. The body is of special length to reach to the bottom of a deep hole in a cast-steel tractor part. Pilots revolve with the work in order to prevent seizing. Similar pilot arrangements can be furnished with Style LT collapsible taps in all sizes from $1\frac{1}{8}$ to 12 in.



Tap, Collapsible, Yoke-Operated

Landis Machine Co., Waynesboro, Pa. (Vol.80,p.1018.)

This yoke-operated collapsible tap was developed for use on automatic screw machines. It is a modification of the Style LT collapsible tap and can be used either as a stationary or rotary tap. The tap can be furnished in sizes ranging from $1\frac{1}{8}$ to 12 in. diameter.



Toolbits, Pre-Formed

The Equipment Co., 11246 E. Vernor Highway, Detroit, Mich. (Vol.80,p.602.)

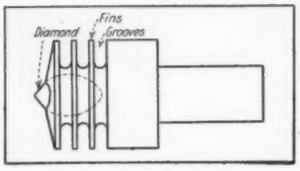
"General" pre-formed toolbits made by the General Tool Bit Corporation, Detroit, are being distributed by the above concern. The toolbits are available in standard sizes, ground all over. The bits receive a series of heat-treatments and a series of grinds

and are furnished in both high-speed steel and in cobalt super-high-speed steel.

Wheel Dresser, Diamond, Finned

F. F. Gilmore & Co., 112 Dartmouth St., Boston, Mass. (Vol.80,p.279.)

This diamond wheel dresser is designed with annular grooves separated by thin fins. The grooves carry the water close to the diamond, and the



fins, surrounded by the coolant, tend quickly to dissipate the frictional heat generated by the wheel. The cooling effect of the grooves and fins maintains a more even temperature of the wheel dresser and prolongs the life of the diamond.

Transmission Equipment

Belting

New York Belting & Packing Co., 1 Market St., Passaic, N. J. (Vol.80,p.391.)

The "Beltpaco Junior" transmission belting for light work is designed for light or fractional-horsepower drives, transmission drives characterized by light tensions, small pulleys and small bearings, small machine or machine tool drives and auxiliary drives in machines. It is also adapted for use as shaping or forming belts in machines processing materials where its functions are like that of a special light conveyor.

Belts, Compensated

Manhattan Rubber Mfg. Div., Raybestos-Manhattan, Inc., Passaic, N. J. (Vol.80, p.1059.)

Style "S" and "B" Condor compensated belts are especially designed for those unusual conditions which require some belt slippage. Both have the Condor compensated principle of equalized-ply stresses at the arc of contact. These belts differ from the regular Condor belts only in belt surface.

Belt Couplings, V-Belt, "Grip-Flex"

Shippert Mfg. Co., 414-6 S. Galena Ave., Dixon, Ill. (Vol. 80,p.936.)

An easily attached, flexible, V-belt coupling has been announced for all standard V-belt sizes. Features of its construction include anchor plates that completely surround the belt ends, trailer pins in the larger sizes to ease heavy loads and shocks, and casehardened link-pin bearings. Because of its gripping action, the "Grip-Flex" coupling can be used on either fabric or cord type belts.

Belt Lacing, Flexible "Tek-Lace"

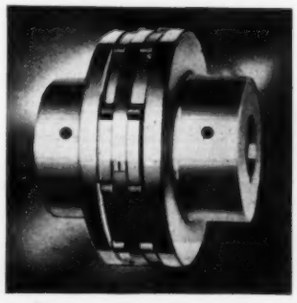
Sudbury Laboratory, Box 330, S. Sudbury, Mass. (Vol. 80,p.1022.)

"Tek-Lace" is a treated fiber lacing of high tensile strength that can be applied with an ordinary awl. Each strand is 0.55-in. diameter and has a tensile strength of 100 lb. This lacing is suitable for flat or V-belts.

Coupling, Flexible, Heavy-Duty

Lovejoy Tool Works, 4956 West Lake St., Chicago, Ill. (Vol.80,p.528.)

This non-lubricated, heavy-duty flexible coupling" is designated as L-R Type 'W." The individual load cushions are free floating between the metal jaws and rest upon the central hub, being secured by a spiral steel spring.



Cushions are free to move and adjust themselves to any momentary position of the jaws, permitting larger load carrying surfaces and greater capacity.

Couplings, Flexible

Certified Flexible Couplings, Inc., 122 E. 42nd St., New York, N. Y. (Vol.80,p.640.)

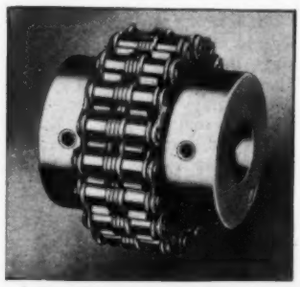
A rubber spider cushion is used between the halves of this flexible coupling. The lugs on the spider are convex curved and mate with concave curved surfaces in the

lugs on the two coupling halves. Thus, uniform compression on the insert is maintained even though the coupling is operating under misalignment.

Coupling, Flexible, Improved

Diamond Chain & Mfg. Co., Indianapolis, Ind. (Vol.80, p.674.)

The coupling now consists of two sprockets encircled by a length of Diamond double-strand roller chain, instead of

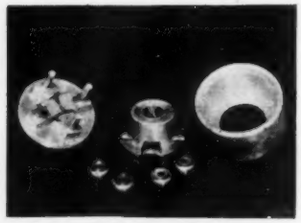


single strand. Clearance is provided between the sprocket teeth and the chain side plate to permit misalignment of the connected shafts.

Coupling, Flexible

Harris Coupling Co., 265 W. 40th St., New York, N. Y. (Vol.80,p.1022.)

This universal, self-aligning shaft coupling allows parallel misalignment of $\frac{1}{8}$ in., angular misalignment of 15 deg. either way and provides for an end float of $\frac{1}{4}$ in. Lateral thrust is said to be eliminated

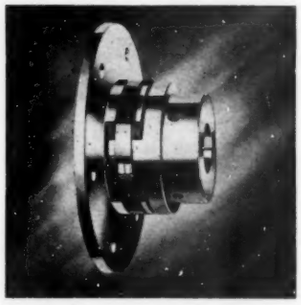


on the driving and driven shafts. The No. 1 size coupling now being introduced is shown in the exploded view. Couplings are made in horsepower ranges from 3 to 500 hp. and in bore sizes of $\frac{3}{4}$ in. and up.

Couplings, Flexible

Lovejoy Tool Works, 4956 W. Lake St., Chicago, Ill. (Vol. 80,p.1090.)

One of the coupling bodies of the Type WF flexible coupling is made in the form of a flange which bolts on to the flywheel or clutch of the engine. The flange-body de-



sign reduces the overall length of this coupling by one-third. It is made in sizes from 3 to 14-in. bores, suitable for 2,500 hp. at 100 r.p.m.

Clutch, Hydraulic, Forging-Machine

Ajax Mfg. Co., 3830 Lakeside Ave., Cleveland, Ohio. (Vol.80,p.176.)

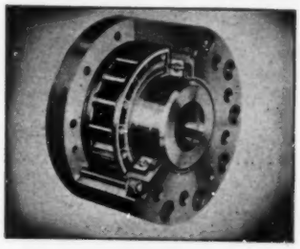
A hydraulic clutch is available for the "Ajax" line of heavy forging machinery as an alternate to direct pneumatic-operated clutches. It was developed for a large automobile plant to meet specific require-

ments. The hydraulic clutch is of the multiple-disk friction type. No toggles, wedges or yokes are used to transmit the hydraulic pressure which acts directly upon the clutch plates. Compression springs retract the piston and disengage the plates when the pressure is relieved. A small, high-speed pump supplies the hydraulic pressure for the clutch, making the machine a self-contained unit. Clutch torque is controlled by the pump setting.

Clutch, One-Way

Morse Chain Co., Division of Borg-Warner Corp., Detroit, Mich. (Vol.80,p.1057.)

The Kelpo-type free-wheeling, or one-way, clutch coupling is available for relieving driving or driven shaft loads. Several sizes are available, adapted

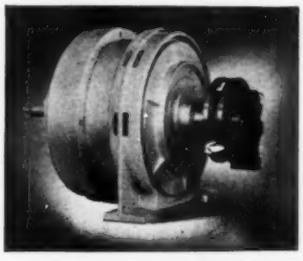


to a range from ¼ to 100 hp., per 100 r.p.m. They can be provided with either the Morse Morflex rubber-insert couplings or the Morse chain couplings when required.

Clutch-Brake, Combination

Magnetic Mfg. Co., Milwaukee, Wis. (Vol.80,p.355.)

The Style "E" combination magnetic clutch-brake is 24 in. in diameter, developing a clutch torque of 4,500 lb.-ft. and a brake torque of 1,500 lb.-ft.

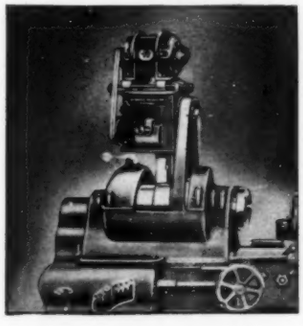


It incorporates smooth acceleration, lower power-factor losses, and gives quick, snappy automatic stopping.

Motor Drive, Machine Tool

W. L. Steege Machinery Co., 18 S. Clinton St., Chicago, Ill. (Vol.80,p.71.)

Five sizes are available for lathe application, three for shapers and five for milling

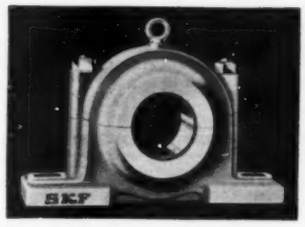


machines. The universal motor drive illustrated has a base that fastens to the floor and is tied to the machine with a short cross arm. Power is taken from the motor by a V-belt to the drive shaft of a gearbox below. Here there are four changes of speed to the single flat-belt pulley drive to the machine. This model is made in two sizes to deliver from 1 to 2 hp. and from 3 to 5 hp.

Pillow Block, SA Type

SKF Industries, Inc., Front St. & Erie Ave., Philadelphia, Pa. (Vol.80,p.32.)

This SA type pillow block is self-aligning because of the spherical roller bearings employed. A split construction

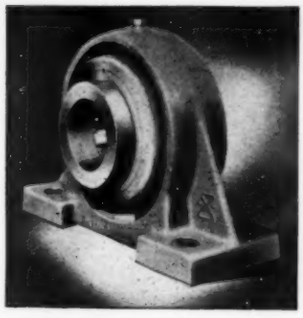


provides for the least possible number of parts. Sealing rings shield the bearings against dirt.

Pillow Block, Self-Aligning

Palmer-Bee Co., Detroit, Mich. (Vol.80,p.603.)

The bearing operates on a ball and socket principle that permits a free oscillating movement of about 3 deg. maximum in any direction and at the

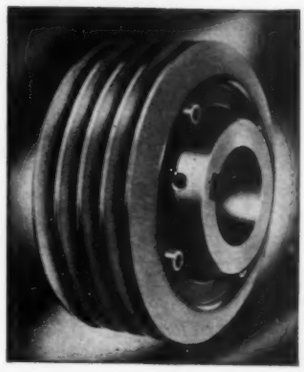


same time maintains accurate alignment of the shafts without binding. The pillow block is mounted with a Hyatt heavy-duty precision bearing in a machined housing.

Sheave, V-belt

Dodge Mfg. Corp., Mishawaka, Ind. (Vol.80,p.1058.)

The "DR" Sheave consists of a hub on which can be mounted rims of varying diameters and number of grooves. The rims can be mounted in four different positions so that the hubs can be approximately



central or have varying amounts of offset as required. For applications where speed must be changed, the hub can be permanently mounted on the shaft and rims interchanged as often as required.

Speed Reducers, Worm-Gear

Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia, Pa. (Vol.80,p.34.)

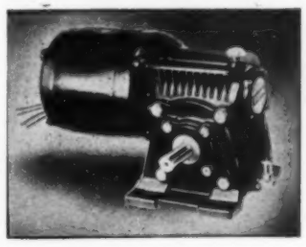
A line of cut-tooth, worm-gear speed reducers of compact construction is being offered. These reducers are available in a wide range of

ratios and capacities, with single or double reduction, and in horizontal and vertical types. All are provided with precision tapered roller bearings and automatic lubrication.

Speed-Reducer, Worm-Gear, Heavy Duty

Bodine Electric Co., 2264 W. Ohio St., Chicago, Ill. (Vol.80, p.66.)

A heavy-duty speed reducer capable of carrying ½ hp. loads continuously has been added to the Bodine line. This reducer is for use with the com-

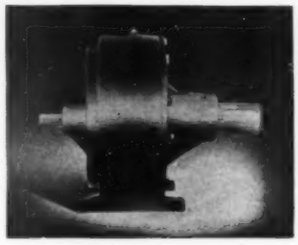


pany's "N-5" motors. Eight standard gear ratios from 8:1 to 48:1 are offered; other ratios can be made to special order.

Speed Reducer, Planetary Type

Winfield H. Smith, Inc., Springfield, N. Y. (Vol.80, p.532.)

The differential reducer provides any ratio from about 20 to 1 up to infinity, within reasonable commercial limits. The

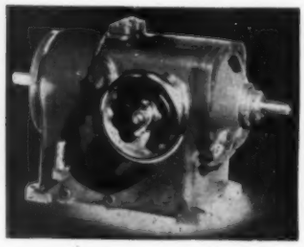


whole, in a compact casing, is a compounded device with additional stages added to the primary planetary system.

Transmission, Fluid, Variable-Speed

Oilgear Co., 1319 Bruce St., Milwaukee, Wis. (Vol.80,p.282.)

The "Oilgear" fluid-power, variable-speed transmission has been simplified by a redesign of input and output units which eliminates thirteen parts from each piston. The output end exerts 88 per cent torque effi-

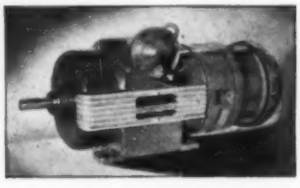


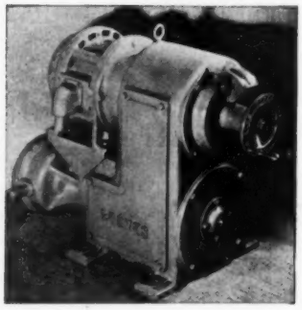
ciency at starting and 97.6 per cent at 120 r.p.m. Output speed ranges steplessly from 5 to 1090 r.p.m. The transmission is available in sizes from 2 to 100 hp., and is controlled either by hand or by automatic direct- and remote-control devices.

Transmission, Variable-Speed

Graham Transmissions, Springfield, Vt. (Vol.80,p.971.)

This self-contained, variable-speed transmission, employing only five major parts, furnishes





any desired output speed from half motor speed down to zero and reverse. This wide range of speed is obtained through a single turn of the control wheel. The unit is so designed that a geared head can be incorporated at the output end without appreciably increasing the over-all length. The geared head provides a reduction up to 7 to 1 or a step-up as high as 1 to 4.

At present this transmission is available in three standard sizes with a range of capacity up to 7½ hp. and in normal and extreme speed ranges. Both units are available with or without geared heads.

Transmission, Motorized, Variable-Speed

Reeves Pulley Co., Columbus, Ind. (Vol.80,p.319.)

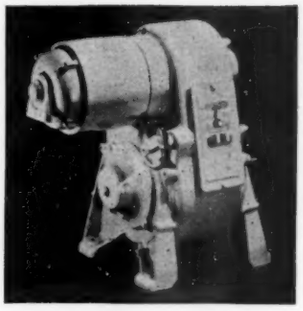
A variable-speed drive combining in a compact, self-contained housing any standard make of constant-speed motor, a variable-speed control, and, where required, speed reduction gears, has been developed for industrial applications. Speed variations provided by this "Motodrive" are infinite between predetermined limits. The "Motodrive" is made in horizontal and vertical types, with four sizes of each to take motors from ¼ to 7½ hp., covering speed ratios from 2 to 1, through 6 to 1.

This drive uses the principle of a V-belt running between two sets of cone-faced disks, which are adjustable mounted on parallel shafts. The drive is ventilated and has positive lubrication with force-feed fittings.

Transmission, Variable-Speed, "Speed-Trol"

Sterling Electric Motors, Inc., Telegraph Rd. at Atlantic Blvd., Los Angeles, Calif. (Vol. 80,p.711.)

The improved "Speed-Trol" motor with speed variations has been introduced to supersede the "Vari-Speed" motor.



"Speed-Trol" motor is available with speed variations from 2 to 1 to 6 to 1 and in ratings from ¼ to 15 hp. Speed variation is accomplished by adjusting the diameter of the two V-pulleys which are mounted on fixed parallel shafts and connected by an extra-width V-belt. A universal mounting feature permits assembly of the unit in the position best suited to the application.

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Milling Machines

Adcock & Shipley, Leicester, England.
No. 2, plain milling machine. Vol. 80, p. 638E.

Craven Bros. (Manchester), Ltd., Reddish, near Stockport, England.
Special planer-type milling machine. Vol. 80, p. 457E.
Wobbler-end milling machine for rolls. Vol. 80, p. 639E.

Curd Nube, Offenbach-on-Main, Germany.
Hand-controlled die-sinking, profiling and copying machine. Vol. 80, p. 190E.
High-speed, vertical milling machines. Vol. 80, p. 235E.

Droop & Rein, Bielefeld, Germany.
Three-spindle plano-miller. Vol. 80, p. 125E.
Two-spindle milling machine. Vol. 80, p. 191E.

Alfred Herbert, Ltd., Coventry, England.
Dual-control, plain milling machine. Vol. 80, p. 60E.
Reishauer short-thread milling machine. Vol. 80, p. 605E.

Herbert Hunt & Sons, Old Trafford, Manchester, England.
2-in. automatic flute-milling machine for reamers and taps. Vol. 80, p. 377E.

E. H. Jones (Machine Tools), Ltd., The Hyde, Hendon, N.W., England.
C.V.A. die-sinking and engraving machine. Vol. 80, p. 548E.

Loewe Gesfurel, A G., Berlin, Germany.
Milling machine with coolant system. Vol. 80, p. 468E.

Midgley & Sutcliffe, Bradford, England.
Vertical profile milling machine. Vol. 80, p. 394E.

George Moulton, Ltd., Manchester, England.
Wickman-Moulton thread-milling machine. Vol. 80, p. 280E.

J. Parkinson & Son, Shipley, England.
Horizontal milling machine for long work. Vol. 80, p. 204E.

Ward, Haggas & Smith, Keighley, England.
Plain, horizontal milling machines. Vol. 80, p. 237E.

Planers and Shapers

Butler Machine Tool Co., Ltd., Halifax, England.
7-ft. open-side planer. Vol. 80, p. 365E.
Improved 60 in. draw cut shaper adaptable for milling and boring. Vol. 80, p. 393E.

Craven Bros. (Manchester), Ltd., Reddish, near Stockport, England.
48 in. combined slotting and cross-planing machine. Vol. 80, p. 10E.
Pit-type, 18 ft. by 40 ft. armour-plate planing machine Vol. 80, p. 563E.

Summerskill Bros., Sowerby Bridge, England.
24 by 48-in. open-side crank planer. Vol. 80, p. 681E.

H. A. Waldrich, Siegen, Germany.
"Rigidity" planer. Vol. 80, p. 190E.

Ward, Haggas & Smith, Keighley, England.
Plano-mill planer-type milling machine. Vol. 80, p. 297E.

Presses

Alfred Herbert, Ltd., Coventry, England.
Herbert-Weingarten double-column press. Vol. 80, p. 340E.

Hordern, Mason & Edwards, Ltd., Tyburn, Birmingham, England.
Variable-stroke, 300-ton crank press. Vol. 80, p. 9E.

Hydraulik G.m.b.H., Duisburg, Germany.
2,000-ton hydraulic shipbuilding press. Vol. 80, p. 378E.

Lee & Crabtree, Ltd., Shipley, England.
Double-side, double-crank, 40-ton drawing press. Vol. 80, p. 576E.

Maschinenfabrik Weingarten, Weingarten, Germany.
230-ton friction screw press. Vol. 80, p. 406E.

Joseph Rhodes & Sons, Ltd., Wakefield, England.
Geared, inclinable power press. Vol. 79, p. 739E.
Open-front, double-sided power press. Vol. 80, p. 51E.

Taylor & Challen, Ltd., Birmingham, England.
40-ton, roll-feed power press. Vol. 80, p. 50E.
10-in. armature-plate notching press. Vol. 80, p. 52E.

Welding Machines

General Electric Co., Ltd., Kingsway, London, W. C., England.
Portable, arc-welding sets. Vol. 80, p. 654E.

Holden & Hunt, Old Hill, Staffs, England.
No. 10 auto-electric butt welder. Vol. 80, p. 37E.

Metropolitan-Vickers Electrical Co., Ltd., Trafford Park, Manchester, England.
Paradyne arc-welding set. Vol. 80, p. 623E.

Other Machines

Adcock & Shipley, Leicester, England.
Special gear-wheel cleaning and burnishing machine. Vol. 80, p. 230E.

Butler Machine Tool Co., Ltd., Halifax, England.
Precision slotter with 4-in. stroke. Vol. 80, p. 351E.

W. Canning & Co., Ltd., Great Hampton St., Birmingham, England.
4-gal. sawdust drying-out barrel. Vol. 80, p. 50E.

Climax Rock Drill & Engineering Works, Ltd., Carn Brea, Cornwall, England.
Pneumatic fettling grip. Vol. 80, p. 519E.

Coventry Machine Tool Works, Ltd., Coventry, England.
Automatic screw slotting machines. Vol. 80, p. 130E.
Covmac thread rolling machines. Vol. 80, p. 163E.

Ateliers Demoor, S. A., Brussels, Belgium.
Demoor air power hammers. Vol. 80, p. 352E.

F. J. Edwards, Ltd., Euston Rd., London, N. W., England.
24½-in. swing-beam universal cramp folding machine. Vol. 80, p. 37E.

B. Elliott & Co., Ltd., York Rd., London, N., England.
Spedax 20-in. universal band-sawing machine. Vol. 79, p. 759E.

Greenwood & Batley, Ltd., Leeds, England.
1½-in. hot forging machine. Vol. 80, p. 34E.
No. 3 Greenbat solid-die, double-stroke, cold forging machine. Vol. 80, p. 52E.
Greenbat nail-making machines. Vol. 80, p. 266E.

Gottleib Guhring, Ebingen, Wurttenberg, Germany.
Vertical automatic cutting-off machine. Vol. 80, p. 338E.

Rex Hacksaw & Tool Mfg. Co., First Avenue House, High Holborn, W. C., England
Rex bench sawing and filing machine. Vol. 80, p. 562E.

Henley Extrusion Machine Co., Ltd., 11, Holborn Viaduct, E. C., England.
Lead-extrusion sheathing machine. Vol. 80, p. 187E.

Alfred Herbert, Ltd., Coventry, England.
Whitworth metal cutting bandsaw. Vol. 80, p. 562E.

Hey Engineering Co., Ltd., Coventry, England.
Duplex gear-tooth chamfering machine. Vol. 80, p. 469E.
Triple-head nut tapping machine. Vol. 80, p. 680E.

J. Holroyd & Co., Ltd., Milnrow, England.
Abrasive-wheel, cutting-off machine. Vol. 80, p. 668E.
Cutting-off machine for turbine blade packing pieces. Vol. 80, p. 695E.

Hopkinsons, Ltd., Huddersfield, England.
Centrifugal oil purifier. Vol. 80, p. 339E.

Hunton, Ltd., 114 and 116, Euston Rd., London, N.W., England.
Grubel folding machines with universal features. Vol. 80, p. 237E.
Hand-operated, curve-cutting shear. Vol. 80, p. 682E.

Lee & Crabtree, Ltd., Shipley, England.
Lecra still-can seaming machine. Vol. 80, p. 295E.

Mass Products, Ltd., Parkstone, Dorset, England.
36-in. gang sliting machine. Vol. 80, p. 36E.

Maschinenfabrik Weingarten, Weingarten, Germany.
Toggle-operated guillotine shears. Vol. 80, p. 322E.

Midgley & Sutcliffe, Richmond Rd., Bradford, England.
Notching machine for weighbridge arms. Vol. 80, p. 494E.

Joseph Rhodes & Sons, Ltd., Wakefield, England.
13 ft. 6 in. high-speed plate shears. Vol. 80, p. 50E.

G. Richards & Co., Ltd., Broadheath, near Manchester, Engleand.
Goliath internal keyseater. Vol. 80, p. 546E.

S. Russell & Sons, Ltd., Leicester, England.

Classified Index of European Equipment—Continued

Copper plate sawing machine. Vol. 80, p. 694E.
24-in. Hydrofeed cold-sawing machine with hydraulic vise. Vol. 80, p. 697E.

Alfred H. Schuttee, Koln-Deutz, Germany.
Forst, vertical, surface broaching machine. Vol. 80, p. 249E.

Gebruder Thiel G.m.b.H., Ruhla, Germany.
Thiel metal bandsaw with tilting frame. Vol. 80, p. 249E.

Gustav Wagner, Reutlingen, Germany.
Threading machines with tangential dies. Vol. 80, p. 235E.

Wild-Barfield Electric Furnaces, Ltd., North Rd., Holloway, N., England.
Hairpin Minor electric heat-treating furnace. Vol. 80, p. 51E.

Machine Accessories

David Brown & Sons (Huddersfield), Ltd., Huddersfield, England.
Roloid double-helical gear pumps. Vol. 79, p. 726E.

Alfred Herbert, Ltd., Coventry, England.
Tangic self-opening die heads. Vol. 80, p. 35E.
Ardoloy-tipped drawing dies. Vol. 80, p. 456E.

Loewe Gesfurel A. G., Berlin, Germany.
Loewe milling, grinding and drilling appliances. Vol. 80, p. 445E.

Lorant & Co., Ltd., 98 Croydon Rd., London, S.E., England.
Self-aligning tool holder for horizontal or vertical machine. Vol. 80, p. 295E.

J. Neill & Co. (Sheffield), Ltd., Napier St., Sheffield, England.
Eclipse circular, non-electric magnetic chuck. Vol. 80, p. 366E.

Pittler Werkeugmaschinenfabrik, Leipsiz-Wahren, Germany.
Swiveling toolholder and cam-turning attachment for Pittler turret lathe. Vol. 80, p. 679E.

Portable Tools

Aviation Developments, Ltd., 29 and 31, Euston Rd., London, N.W., England.
Chobert automatic hand riveting tool. Vol. 80, p. 442E.

Bosch, Ltd., Larden Rd., Acton, W., England.
Electric hammer. Vol. 80, p. 28E.

Broom & Wade, Ltd., High Wycombe, England.
Portable pneumatic nibbler. Vol. 80, p. 593E.

Buma Engineering Co., Boyd St., Newcastle-on-Tyne, England.
Gap milling tool for piston rings. Vol. 80, p. 519E.
Portable cylinder boring machine. Vol. 80, p. 520E.

Desoutter Bros., Ltd., Hyde, Hendon, N.W., England.
Pneumatic and electric screw guns. Vol. 80, p. 11E.

Fry's (London), Ltd., 25, King St., London, E., England.
¼-in. electric hand-operated drill. Vol. 79, p. 727E.

General Electric Co., Ltd., Kingsway, London, W.C., England.
Portable electric blowers. Vol. 80, p. 493E.

Grimston Electric Tools, Ltd., 16 Provost St., London, N., England.
Flexible-shaft grinder. Vol. 80. p. 267E.

S. Wolf & Co., Ltd., Hanger Lane, Ealing, W., England.
Ball-bearing, polisher. Vol. 80, p. 36E.
6-in. flexible shaft electric grinder. Vol. 80, p. 281E.

Electrical Equipment

Bull Motors, Ipswich, England.
Bull Junior fractional-hp. a.c. motors. Vol. 79, p. 789E.

Higgs Motors, Ltd., Witten, Birmingham, England.
Reduction gear units. Vol. 79, p. 757E.

Laurence, Scott & Electromotors, Ltd., Norwich, England.
Hyposynchronous electric motors. Vol. 80, p. 27E.

British Thomson-Houston Co., Ltd., Rugby, England.
Pre-set speed controller for variable-speed motors. Vol. 80, p. 323E.

Gaging and Measuring Equipment

Coats Machine Tool Co., Ltd., Coastal Chambers, Elizabeth St., Victoria, S.W., England.
Prestwich fluid gage for production work. Vol. 80, p. 534.

Foster Instrument Co., Ltd., Letchworth, England.
Disappearing-filament type optical pyrometer. Vol. 80, p. 37E.

Hahn & Kalb, Stuttgart, Germany.
Subito internal cylinder gage. Vol. 80, p. 694E.

J. Leete & Co., Ltd., Coventry, England.
Hercules dial gage. Vol. 80, p. 681E.

E. G. Herbert, Ltd., Levenshulme, Manchester, England.

Taylor, Taylor & Hobson, Ltd., Leicester, England.
Profile projector. Vol. 80, p. 35E.

Testing Equipment

G. H. Alexander Machinery, Ltd., Birmingham, England.
British-built, Rockwell hardness tester. Vol. 80, p.52E.

E. G. Herbert, Ltd., Levenshulme, Manchester, England.
Production brinelling machine for airplane engine cylinders. Vol. 80, p. 394E.
Wire testing machines. Vol. 80, p. 468E.

J. Parkinson & Son, Shipley, England.
Parkson gear tester. Vol. 80, p. 561E.

A. C. Wickman, Ltd., Coventry, England.
Wimet indenter for Brinell tests. Vol. 80, p. 481E.

Carl Zeiss, Jena, Germany.
Division tester for gears. Vol. 80, p. 574E.

Transmission Equipment

D. Brown & Sons (Huddersfield), Ltd., Huddersfield, England.
Radicon worm reducer for strip mill drive. Vol. 80, p. 282E.

Crofts (Engineers), Ltd., Bradford, England.
Variable speed, V-rope pulley drive. Vol. 80, p. 430 E.

Cyclo G.m.b.H., Munich, Germany.
Reduction gear units of epicyclic type. Vol. 80, p. 221E.

Wearn's Autoflex Drives, Ltd., Sloane Terrace, London, S.W., England.
Automatic belt-tensioning reduction units. Vol. 79, p. 788E.

Eisenwerk Wulfel, Hannover-Wulfel, Germany.
Wulfel hydraulic variable speed transmission. Vol. 80, p. 353E.

Miscellaneous Equipment

Bowen Instrument Co., 9, Newton Rd., Leeds, England.
Pyroreg automatic furnace temperature control. Vol. 80, p. 279E.

British Ropeway Engineering Co., Ltd., 14 to 18, High Holborn, W.C., England.
Aerial ropeways for material handling. Vol. 80, p. 625E.

David-Brown & Sons, (Huddersfield), Ltd., Huddersfield, England.
Large, double-helical rolling-mill drive gears. Vol. 80, p. 161E.
Cone-ring flexible coupling. Vol. 80, p. 297E.

Buma Engineering Co., Boyd St., Newcastle-on-Tyne, England.
Safety holding fixture for small screws or rivets. Vol. 80, p. 606E.

C. F. Casella & Co., Ltd., Fitzroy Square, London, W., England.
Focal copying machine. Vol. 79, p. 727E.

Crofts (Engineers), Ltd., Thornbury, Bradford, England.
Internal-gear type all-metal flexible coupling for rolling mill applications. Vol. 80, p. 380E.

General Electric Co., Ltd., Kingsway, London, W.C., England.
Witton-Kramer mono-rail electric hoists. Vol. 80, p. 146E.

Hick, Hargreaves & Co., Ltd., Bolton, England.
Rotary air compressors. Vol. 80, p. 176E.

Imperial Chemical Industries, Ltd., Millbank, S.W., England.
Self-tightening, high pressure pipe joint. Vol. 80, p. 221E.

R. Klinger, Ltd., 120, Southwark St., London, S.E., England.
"Klingerit 1,000" gasket material for low pressure water and steam joints. Vol. 80, p. 469E.

Liptak Furnace Arches, Ltd., 50, Palace St., Victoria, London, S.W., England.
Gako gas burners for heat-treating furnaces. Vol. 80, p. 564 E.

E. N. Mason & Sons, Ltd., Colchester, England.
Arclight universal drafting table. Vol. 80, p. 147E.

James Neil & Co. (Sheffield), Ltd., Sheffield, England.
Pad handle for hack saw blades. Vol. 80, p. 222E.
Hack-saw frame with magazine for spare blades. Vol. 80, p. 494E.

Nomy Bearings, Ltd., 520, Grand Buildings, Trafalgar Square, London, W.C., England.
Aktiebolaget Nomy (Ulvsunda, Stockholm, Sweden) block type journal and thrust bearings. Vol. 79, p. 751E.

Rawlplug Co., Ltd., Cromwell Rd., South Kensington, S.W., England.
Adjustable and ratcheting spanner wrenches. Vol. 80, p. 62E.

Silentbloc, Ltd., Victoria Gardens, London, W., England.
Silentbloc anti-vibration machine mountings. Vol. 80, p. 430E.
Silentbloc flexible couplings. Vol. 80, p. 442E.

J. B. Stone & Co., Ltd., 135, Finsbury Pavement, London, E.C., England.
8 in. flat-belt cutting tool. Vol. 80, p. 63E.

Responsible Bargaining

COLLECTIVE bargaining is represented by the labor propagandists as the ultimate ideal in industrial relations. When you analyze it it doesn't seem to be a very high ideal. Are we to be satisfied with a system that places employers in one armed camp, employees in another, and the public on the outside, impotent to take care of its interests?

As a step toward an ideal system of industrial relations collective bargaining may be justifiable. To our mind an ideal to aim at would be a situation where employer and employee recognized a common goal and cooperated to attain it. The goal is attainable because some companies have already reached it.

In the meantime what can we do with collective bargaining as a transition expedient? A bargain implies some sort of an agreement between two responsible parties. In this case the employer is a responsible party and is hemmed in by all sorts of legal restrictions, state and federal. But the same cannot be said of employees whether they are organized in unions or not. The trades union is specifically exempted from most of our regulatory laws and cannot be held to any measure of responsibility in the vast majority of instances. Its officers do not have to make any accounting for their actions or for the funds collected from members, either to the members or to the government. They have defeated every attempt to make them responsible to anybody.

When one considers the use of the sit-down strike, an entirely illegal operation, or the racketeering and graft practiced by the electrical unions now under indictment in New York City, it is easy to see why incorporation is anathema to the labor organizer. But until labor unions are made responsible it is futile to talk of making much progress through collective bargaining where a union is a bargainer.

CHIPS

WASHINGTON

President sends message to Congress detailing a sweeping revision of the executive branch of the government including new Secretaries of Welfare and Public Works and 6 administrative assistants, and absorbing independent commissions and boards into existing departments in the interest of administrative efficiency . . . Senator Byrd criticises it for lack of economies, former Controller General McCarl for its proposal to eliminate control of Congress over expenditures . . . Berry submits legislative program which he says represents wishes of industry and labor . . . Army asks $150,000,000 for decent quarters for officers and men . . . House bill proposes independent army air force . . . Power policy board appointed to settle row between TVA heads Morgan and Lilienthal . . . In his inaugural address Roosevelt promises to carry on the reforms started during his first administration . . . John L. Lewis says he expects Roosevelt to repay election debt by intervening on the side of C.I.O. in automobile strike.

FOREIGN

Rumor emanates from Moscow that failures of Russian automobile plants to produce quotas will result in recall of foreign engineers to get things moving . . . Spanish Rebels renew attacks on Madrid with German and Italian backing . . . Great Britain signs trade treaty with Canada that cuts another slice off of American business and may make the going harder for an American-British treaty . . . France offers trade treaty to Hitler as entering wedge in campaign to settle other differences . . . Observer reports German pilots using Spanish Morocco as flying base for raids on Spain . . . Soviets start treason trial of 16 high officials.

FINANCE

December operating income of railroads up 22 per cent . . . RFC has sufficient surplus to cover all losses . . . Stabilization fund extended to 1939.

INDUSTRY

Flint riots bring out Michigan National Guard . . . Governor Murphy's joint meeting fails to materialize as both sides charge bad faith . . . Sloan and Knudsen go to Washington but negotiations fail . . . Atlantic Refining orders largest all-welded tanker . . . Dewey opens drive on racket controlling New York's electrical contracting industry . . . Eastern unions of marine engineers and deck officers call off strike, claiming that they have been embarrassed by false statements coming from unauthorized "leaders" . . . U. S. Steel announces $60,000,000 modernization program . . . Copper price, 13 cents, is highest in seven years . . . Ford turns out 25 millionth automobile . . . Pittsburgh Plate Glass ends strike by granting 8 cents an hour increase but not the closed shop or the check-off.

INDICATORS

Steel production maintains an output level of 80 per cent despite auto strike . . . Electric power generation sets a new high record . . . Business Week's index falls again reaching 79.2.

Goes to Glenn L. Martin

GARDNER W. CARR

Martin to Expand

Gardner W. Carr, newly elected vice-president and general manager of the Glenn L. Martin Co., Baltimore will put into operation the company's new $2,000,000 expansion program which will soon provide the world's largest assembly plant for aircraft. Mr. Carr was vice-president of the Boeing Aircraft Co., Seattle. About $600,000 will be spent on machinery and the assembly hall will measure 300 x 500 ft. with a 40 ft. clearance.

Motor Trends Traced at S. A. E. Annual Meeting

DETROIT—Perhaps the high spot of the annual meeting of the Society of Automotive Engineers in Detroit, January 11–15, was the annual dinner at which Dr. Hugo Eckener, commander of the Graf Zeppelin, spoke on the airship and its place in transportation. Harry T. Woolson, executive engineer of Chrysler Corp., was elected president to succeed Ralph Teetor of the Perfect Circle Co.

The present policy of car manufacturers in sharing their experiences with competitors has been an important factor in the development of machinery and equipment to the present high state of efficiency, said F. C. Pyper, chief master mechanic of the Buick Motor Co., in his paper on "Developments in Close Machining Practice in Automotive Production." George Miller, budget supervisor of the Chrysler and Kercheval plants of Chrysler Corp., asserted that there are four important factors determining success or failure of a budget system: proper analysis and methods used to establish budgets, proper administration of budget control, wholehearted support by the management, and cooperation of all department heads. G. O. Hoglund, Aluminum Co. of America, described spot and seam welding of aluminum alloys (*AM*—Vol. 81, page 17).

The chassisless coach, modeled after William B. Stout's Scarab rear-engined car, was discussed by Stanley Knauss, manager of the motor coach division of Gar Wood Industries, Inc. Edward G. Budd pointed out in a paper the aircraft trend in body structural design, with integral construction of body and chassis members.

Diesel trucks promise to weigh more and cost more than gasoline trucks for some time, according to B. B. Bachman, Autocar Co., in his paper on "Diesel Engines in Trucks." C. G. Anthony, Pacific Freight Lines, said that the diesel has more than doubled the economic sphere of trucks.

Harry G. Davis, director of research of the Farm Equipment Institute, predicted that farm mechanization will soon be complete and farm products will be raised at less and less cost. V. P. Rumely, Hudson Motor Car Co., pointed out that the tractor and motor car industries have a common interest in each other's work.

For the first time the society devoted a session to the house trailer. Philip H. Smith said that 1937 trailer production will be at least double that of 1936.

Machine Tool Orders Reach All-Time High

A jump of 110.6 points in the index of the National Machine Tool Builders Association was brought about in December by a flood of new orders. The index now stands at 257.7. This is far above the best month of 1929. February of that year had an index of only 186. December was also much better than the previous record month, January, 1920, when the index was 231.

Three factors contribute to this sensational rise. First, machine tool prices are advancing in line with higher building costs; second, customers are now making long-postponed replacements of obsolete equipment; third, purchasers are anticipating delays in receiving equipment.

The greatly increased business is proving of benefit to at least 75 per cent of the companies reporting. The table "Distribution of Orders" shows that only 6.7 per cent of these companies have less than 20 per cent of their 1926 level of business. Those that are occupied at a rate of 200 per cent or better increased to 28.4 per cent of the total, or a gain of 80 per cent over November.

Foreign orders taken in December are a smaller percentage of the total, but in value they are appreciably ahead of November. The average index of total orders for the year is 136.3. This exceeds the average of 131.2 for 1928 and is surpassed only by the 1929 average of 155.8.

Index of Machine Tool Orders

Based on Volume of Shipments for 1936

Month	Index of Orders: Domestic	Foreign	Total	3 Months' Average Index	% Foreign to Total Orders
1936 — January	95.7	15.1	110.8	102.6	14
February	99.8	12.3	112.1	107.1	11
March	89.0	16.3	105.3	109.4	15
April	110.9	14.8	125.7	114.4	12
May	95.7	23.2	118.9	116.6	19
June	106.5	22.3	128.8	124.4	17
July	104.4	45.7	150.1	132.6	30
August	96.1	31.4	127.5	135.5	24
September	82.9	35.6	118.5	132.0	30
October	105.4	31.1	136.5	127.5	23
November	110.7	36.4	147.1	134.0	25
December	205.7	52.0	257.7	180.4	20

Distribution of Orders

Average Indexes of Individual Companies Based on 1926 Level of Business	Companies in Per Cent of Total Number Reporting: 1935 1st Quar.	1935 2nd Quar.	1935 3rd Quar.	1935 4th Quar.	1936 1st Quar.	1936 2nd Quar.	1936 3rd Quar.	1936 4th Quar.
200-up	40.2	5.8	14.2	11.3	13.0	17.2	15.8	28.4
100–199	12.5	15.8	22.1	24.3	24.6	32.6	28.8	30.2
60–99	16.9	22.0	17.2	21.7	22.4	19.0	22.9	19.5
20–59	39.6	31.2	31.6	27.7	26.5	21.8	21.7	15.2
Less than 20%	26.8	25.2	14.9	15.0	13.5	9.7	10.8	6.7

Detroit LETTER

Strike has dried up most equipment orders, and 1938 tooling program may be shelved . . . Retail car sales slip, as customers fear work stoppage . . . Ford and Chrysler get glass . . . Independents increase output

Detroit, January 25—General Motors is reopening some plants not affected by strikes to give workers a day or two a week. Of 126,000 men, only 31,000 are on strike. Under the program being launched a payroll of $345,000 a day will be spread among the non-striking employees. Parts will be built for stock, making an outlay of millions for additional inventories above those actually needed. In line with this plan, some orders are going out to parts suppliers.

Sentiment is crystallizing in favor of a plebescite, using regular election machinery, as to whether workers want to return to work pending negotiations, and whether they want the U.A.W. to represent them. The Union is ducking such a vote, but General Motors appears unafraid.

DETROIT—The newspapers have been filled with accounts of the General Motors strike. They have told how John L. Lewis, apparently intending to entrench himself as the country's No. 1 union labor leader, has declared his purpose to crack down on Chrysler and Ford next. Yet no paper has yet related the effect of the current situation and of the troublesome outlook on 1938 tooling programs.

The fact is that equipment orders have almost dried up from all automobile companies except Ford. Tooling plans for next year are being held in abeyance until car manufacturers can find out where they are heading. General Motors says that by Feb. 1 it will be 150,000 cars behind its '37 schedule. Every day beyond that time which passes without a strike settlement will see the corporation getting around 10,000 cars farther behind. It is understandable then that talk has started about the entire program for 1938 being shelved until 1939.

Whether the corporation will shove back its plans for a year depends on factors yet undertermined. Obviously it will have to make changes if Chrysler and Ford go ahead with important tooling programs for '38. It is conceivable, however, that these two companies in the spring may experience serious interruptions to production if Mr. Lewis carries out his threats. In that event, all of the Big Three will be in the same position so far as delays are concerned.

It is believed that developments in the next two weeks will reveal what the corporation's policy will be. If the present strike should go into February with a settlement still far distant, preponderant opinion will favor just enough changes for next year to make the public think it is getting a new product. The New York Show is to begin Oct. 27. This means that General Motors will have considerably less than the normal time for producing '37 models.

Machinery builders point out that the industry will have to move soon toward purchases of equipment if it intends to do much tooling for next year. Machine tool plants are loaded with work and deliveries cannot be made in less than from three to seven months. If all of the Big Three run into labor difficulties which interfere with production for an extended time, it is possible that the New York show in the fall may be postponed a few weeks or even a month.

Another factor may have a far-reaching influence. Retail car sales have gone into a tailspin in Michigan, Ohio and Indiana, where most of the G. M. plants are located. Even car makers outside of the corporation's ranks have been adversely affected. People are alarmed at the stoppage of incomes of tens of thousands of workers and are holding onto their money to see what happens.

At the moment Ford and Chrysler, as well as the independent companies,

"Beauty Experts"—**These men are repolishing the surface of a 20-ton die that draws the roof, front and back window openings, and cowl of the Plymouth from a single sheet. One set of dies for this operation represents 45,000 man hours of patient work**

are fattening their sales at the expense of General Motors. Ford is turning out 6,600 cars a day five days a week and intends to maintain that pace through the winter and spring.

Its glass supply will more than take it through the period until Libbey-Owens-Ford is again in full production. Chrysler has amazed everybody by its ability to secure enough glass from Belgium to keep its operating close to capacity up until last Thursday, when it had to forego one day's work on Friday because of a glass shortage. It resumed production on Monday. If it is forced to suspend work again, it is likely to be only for a day, because the Pittsburgh Plate Glass strike is over and Chrysler this week will begin receiving glass from its regular supplier.

Packard is going at better than a seasonal pace. If the truth were known, part of its good fortune is attributable to business it is getting from G. M.'s inability to produce. It is now installing much new machinery purchased to expand its capacity for building the One Twenty and the six. Hudson is making 85 cars an hour five days a week. It is running two assembly lines to capacity. It has found it more economical to operate two lines fairly steadily throughout the production year than to try to run three lines in the peak season and then only one in slack periods. This policy too results in a better income and steadier work for its regular employees. Studebaker is going to town with its '37 models, assembling 9200 units this month. Nash has been moving along at top speed. Willys-Overland is off to a good start. It built 7001 cars up to Jan. 20. Graham-Paige has been down the past week because it ran out of glass.

Ford Buys Machinery

Ford has been placing orders for considerable machinery lately in line with its program to expand production at the Rouge plant. It is bringing in to Dearborn much work which has been done outside, such as manufacture of brakes and tires and production of glass.

Graham-Paige has been selected to manufacture tractors for Sears Roebuck, which is planning to reenter the tractor business next summer.

Chrysler of Canada will spend several million dollars expanding its facilities at Windsor in the near future. Both Chrysler and Ford appear to be aiming at a higher Canadian content in the cars made in Canada.

Ohio Valley Industries Hard Hit

Disastrous fires in Cincinnati's Mill Creek district added their toll of damage to that of river water and mud in crippling industrial plants in that area. With the river seven feet above any previous record, plants that had never suffered before and were thought to be safe were caught by the water. Where water did not actually enter plants, shut downs have been forced because employees found it impossible to get to work. Covington, Kentucky, is as badly off as Cincinnati, and Evansville, Indiana, and Louisville are perhaps even worse off.

Pittsburgh has apparently escaped a recurrence of the St. Patrick's Day disaster of 1936 but other up-river cities like Wheeling and Portsmouth are considerably worse off than they were then. Because of the experiences of last year industries will probably suffer less sustained damage now than they did then. Electrical equipment and other portable equipment has probably been moved above the danger level in many plants. Interruption of railroad and other transit facilities will surely slow down activity for days or weeks to come, and will delay still further delivery dates on equipment that is already long overdue.

Human suffering will be severe but the nation is mobilizing its resources to take care of it. Getting men back to work will come later but will be almost as important a task. The best way that customers of industries in the flooded areas can help is to be reasonable about unavoidable delays and adjust as best they can to the handicaps that will result.

Industrial Review

• Orders for machinery and machine tools were well sustained in January in all industrial centers despite price increases that drove a lot of business in during December. The two bad spots are the General Motors strike in and around Detroit and Flint and the flood devastation of the Ohio Valley. How far reaching the effects of the flood will be no one can tell now, but deliveries from machinery building plants in that area are sure to be still further delayed.

• In New England the expectation is that the good business of December and January will continue for some time to come. The same feeling persists in New York where the volume of orders is high. Philadelphia distributors report excellent business in January but they look for some recession in the next couple of months. From Pittsburgh comes word that January business has been fair and that no labor trouble is anticipated at the present time. This city is apparently going to escape severe flood damage.

• Detroit machinery business is naturally suffering as a result of the strike and the same is true of the supply business. Distributors are preparing for a rush when production is resumed in the closed plants. Strikes in General Motors plants in Indiana have also slowed down the machinery business in that territory and further damage is to be expected as a result of the Southern Indiana floods. Everything is at a standstill in Cincinnati because of the flood havoc there and the added fire damage.

• New business in January was better than had been expected in St. Louis in view of the December spurt, and prospects are good unless further strikes cripple industry. Four thousand men are idle as a result of the General Motors strike. Business in the Chicago and Milwaukee territories has kept up fairly well although the effects of the General Motors strike have been felt there too. Prospects for the immediate future are uncertain.

• Business which continues to hold up, despite prolonged labor difficulties on the Pacific Coast, indicates an uptrend to western industrialists—one which will gain impetus should the maritime strike come to an end.

• In Oakland, Calif., 221 industrial firms reported 10 per cent of their employees have been dropped from payrolls because of strike conditions. In reply to the question, "If the strike continues will you have to shut down?" Forty indicated they would.

WATCHING *Washington*

President starts second term considering labor legislation . . . Opposition to maximum-hours bill grows in Congress . . . Reduction sought in relief outlays . . . Hearings begin on O'Mahony bill

WASHINGTON—Rain at the inauguration dampened New Deal enthusiasts but not the President's plan to translate national wealth "into a spreading volume of human comforts hitherto unknown." So adroitly worded was the inaugural address that (1) the N. Y. Stock Market rose, indicating a bullish interpretation, and (2) left-wingers, calling it a "share-the-wealth" speech, predicted a resumption of anti-business legislation.

Significant is the fact that on the first full day of office in his second term the President spent over two hours with Senator Black, chairman of the Labor Committee, and author of the longstanding 30-hour week bill. At the conclusion of the conference, the senator expressed his determination to seek action on this measure which he recently reintroduced. As now written the bill would forbid shipments in interstate commerce of commodities in the manufacture of which workers are employed more than five days a week or more than six hours a day. It also prescribes conditions governing purchases and loans by the U. S. Government and permits states to provide definite conditions affecting hours or employment.

Minimum Wage Possible

Strong objections prevail on Capitol Hill on maximum hours as a means for spreading work. There is no quarrel with a limit based purely on health and social grounds, but many legislators feel that any maximum less than an eight-hour day would penalize industries where labor is a large element of cost. Opposition to a minimum wage is not so strong. While great difficulties are foreseen, many believe that a law will be enacted at this session to allow application of prevailing wages in activities on a community basis.

So far as unemployment is concerned, there is a growing conviction among officials and legislators that the country can have as much unemployment as it is willing to pay for. Congress for the first time is beginning to realize that what social workers think of the amounts required for the needy is on a par with what veterans think is needed for pensions. Appropriations for relief face more opposition than at any time since the depression.

Probably a more serious attempt to give Congress control over wages, hours and corporate business in general is the O'Mahoney bill. Hearings start this week before the Senate Judiciary subcommittee of which the Wyoming senator himself is chairman. Following several months of high-tension promotion for this bill, written and supported by the A. F. of L., the senator can be relied upon to make headlines. Though without presidential indorsement, O'Mahoney's backing and constant plugging for the bill forces business to take it seriously. The proposed statute would require every corporation engaged in commerce among the states, by which is meant production or distribution, to take its charter from the government either by license or federal incorporation. Many protective features would be thrown around the right of employees to self-organization, and employers would be bound to comply with all the provisions of the National Labor Relations Act as interpreted by the National Labor Relations Board.. Collective bargaining would be mandatory and guided by the rule that pay shall be raised and hours shortened with increased profits due to mechanization and other causes.

For good measure, the bill would impower the Federal Trade Commission to recommend to Congress a minimum wage for unskilled labor in any industry in which it finds the abuse of labor has not been eliminated by collective bargaining. The commission would also have the power to revoke the license of any corporation which it finds to be at fault in any strike, lockout or other labor dispute in which it has caused the calling out of police or militia to protect strike breakers. Actual administration of the law would be in charge of a Bureau of Corporations, within the Trade Commission, and a Commissioner of Corporations.

Another plan now going the rounds was conceived by Donald Richberg and Ernest Draper, assistant Secretary of Commerce. They suggest amendment of existing anti-trust laws and the creation of a new agency, to interpret the law for those engaged in business and commerce.

Mechanization Penalized

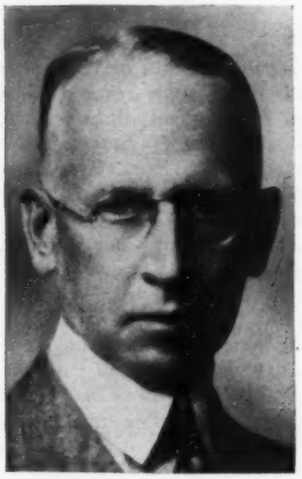
The trend of thought on mechanization is indicated in the award of the board of arbiters between the Illinois Utility Operators Association and the International Brotherhood of Electrical Workers. In the event that work of employees, under this agreement, is curtailed by installation of improved equipment or machinery, those whose work is in excess of 40 hours shall have their hours reduced to not less than 40 hours, to absorb those otherwise displaced.

Questions which naturally arise, if savings due to mechanical improvements are not to be reflected in reduced costs, are: What will be the benefit to the consumer and his standard of living?; and, Will the obligations of a manufacturer, who goes through a development period, put him at a serious disadvantage against a newcomer in the field?

No 30-Hour Law

There will not be any 30-hour week legislation this session—not even with some amendment lengthening that number of hours. The President is still strongly against it. Labor leaders, professing interest, are only using it as a trading point. The unspoken reason is that privately labor leaders only want the government to intervene *when* they are having a fight and *after* they have defined the issues. Any other course would lessen their importance. The same line of reasoning made their enthusiasm about NRA, as Gen. Johnson would have projected it, a bit tepid.—Carter Field, *Washington Bureau, McGraw-Hill Publishing Co.*

N.A.M. President



WILLIAM B. WARNER

Manufacturers Group Elects W. B. Warner

C. M. Chester, chairman of the General Foods Corporation and president of the National Association of Manufacturers during 1936, was elected chairman of the board of the Association for 1937. Wiliam B. Warner, president of the McCall Company, was elected president. The elections took place at the first meeting of the new board of directors, held at the Waldorf-Astoria on Jan. 22.

Mr. Warner is also chairman of the executive committee of American Woolen Company. He has long been active in the industrial leadership of the country and served last year as vice-president of the National Association of Manufacturers.

At the same meeting Thomas E. Wilson, chairman of the board of Wilson & Company, Chicago packers, was elected first vice-president; S. Clay Williams, former NIRA Administrator and chairman of the R. J. Reynolds Tobacco Company, second vice-president; and Walter J. Kohler, former Governor of Wisconsin and president of Kohler Company, third vice-president.

In addition to these officers, the following regional vice-presidents were elected: H. A. Bullis, vice-president, General Mills, Minneapolis; S. Bayard Colgate, president, Colgate-Palmolive-Peet Company, Jersey City; C. S. Davis, president, Borg-Warner Corporation, Chicago; Lammot du Pont, president, E. I. duPont de Nemours & Co., Inc., Wilmington, Delaware; William L. Hoge, president, Hengel Company, Louisville, Ky.; Robert B. Henderson, president, Pacific Portland Cement Company, San Francisco; T. M. Girdler, chairman, Republic Steel Corporation, Cleveland; F. W. Lovejoy, president, Eastman Kodak Company, Rochester, N. Y.; S. Wells Utley, president, Detroit Steel Casting Company, Detroit; H. W. Prentis, Jr., president, Armstrong Cork Company, Lancaster, Pa.; F. B. Davis, president, U. S. Rubber Company, New York.

Railroad-Supplies Man

JOHN H. RODGER

Oxweld Railroad Service Company Names New Head

Announcement has been made by the board of directors that John H. Rodger has been elected president of The Oxweld Railroad Service Company. This company, one of the units of Union Carbide & Carbon Corporation, is in 1937 marking its twenty-fifth year of service to the railroads. Mr. Rodger has been an officer of the company since 1928, first as vice-president and later as executive vice-president.

Prior to his connection with the Oxweld Railroad Service Company, Mr. Rodger was for seventeen years with the Safety Car Heating & Lighting Company in various capacities, completing his service with them as vice-president in New York. He is also a member of the governing board of the Railway Business Association, and past-president of the Railway Electric Supply Manufacturers Association.

WILLIAM J. DURING, chief engineer since 1923 and considered an authority on die-casting machines, has been elected vice-president and a member of the board of directors of the Precision Castings Co.

50 Years in Business

WILLIAM E. KANE

Kane & Roach Celebrates Its 50th Anniversary

A half century ago William E. Kane, founder of Kane & Roach, Inc., began the business which is now well known for straightening machines, cold-rolled forming machines and the wrapping-type bender. During all these years Mr. Kane has been active in the company's management and has developed a wide variety of machines besides those mentioned. He is now being assisted by Robert C. P. Kane, vice-president and chief engineer, and Howard W. Kane, secretary and director of sales.

Mr. Kane, who is now 71, showed a natural bent for mechanics at an early age. When only fifteen and while still in school, he opened a repair shop. At sixteen, however, he left school to become an apprentice with Heald & Morris, the predecessors of the Morris Machine Works which then, as now, built centrifugal pumps. By September of 1887 Mr. Kane had founded the Monarch & Eureka Co., which was the forerunner of the Kane & Roach Company established four years later.

From the start, Mr. Kane's brother-in-law, Bartholomew F. Roach, was connected with him as a salesman and in 1891 became a partner, remaining as such until his death in 1900. The then important carriage and wagon trade interested Mr. Kane and he developed a power hub-boring machine of which many thousands were sold to the leading makers of carriages and wagons throughout the country. A short time later Mr. Kane foresaw the latent possibilities in steel, and developed straightening, forming and bending machines.

Engineering Council Takes Stand on Patents

The growing importance of more intensive and extensive participation in economic and governmental affairs by the engineering profession was the keynote of the seventeenth annual assembly of the American Engineering Council, held in Washington January 14–16. As several delegates pointed out, such participation should not be limited to the activities of the Council alone, but should be developed to a greater extent than ever before by its member bodies, thus extending the influence of the profession into state and local, as well as federal, affairs.

In the field of patents, a committee recommended that the Council: (1) oppose all legislation so far proposed to limit patent pooling or cross-licensing, and that further study be made of past experience with this question to furnish a basis for recommendations; (2) reiterate its opposition to the establishment of a single patents court; (3) take no immediate action on the proposal to appoint scientific advisers in patent cases; (4) oppose all proposals to restrict patent use. The public benefits of cross-licensing, it was found, outweigh its defects, and patent difficulties now encountered are the result of administrative, rather than legal, defects.

A committee report on consumption, production and distribution was presented by title only because of publication difficulties.

All officers whose terms expired at this time were re-elected, including C. O. Bickelkaupt and John S. Dodds, vice-presidents, and Charles E. Stephens, treasurer. The terms of President A. A. Potter and vice-presidents Ralph E. Flanders and Alonzo J. Hammond do not expire until next year. The executive secretary, Frederick M. Feiker, was also re-elected.

A.S.T.E. Forms Large Chapter in Pittsburgh

Forty-five men were enrolled on Jan. 8 as charter members in the Pittsburgh Chapter of the American Society of Tool Engineers. The members elected James R. Weaver, director of equipment, inspection and tests, Westinghouse Electric & Mfg. Company, as chairman; D. L. Shelly of the Westinghouse Airbrake Company as secretary, and Malcolm F. Judkins of the Firth Sterling Steel Company as treasurer. Frank Curtis, manager of the Firthite Division, Firth Sterling Steel Co., was appointed chairman of the program committee. Ford R. Lamb, national president of the society, addressed the meeting and outlined the functions and purposes of the organization.

At Pittsburgh Chapter Organization—F. R. Lamb, national president, American Society of Tool Engineers; D. L. Shelly, secretary; M. F. Judkins, treasurer; J. R. Weaver, chairman; Frank Curtis, chairman program committee

Jap Machinery Exports Increased 11 Per Cent

Japan's exports of machinery and tools during 1936 reached 63,856,000 yen by the end of December, and scored a further increase over previous years. The advance is equal to 6,000,000 yen, or about 11 per cent better than 1935.

Exports to Manchukuo and Kwantung Leased Territory again accounted for more than half of the exports. Combined shipments to these two destinations amounted to more than 40,000,000 yen in value, but exports to China alone dropped 58 per cent to 15,310,000 yen.

A new market was developed in 1936 in the Dutch East Indies which took 88 per cent more than they did in 1935. Increases in exports to British India and the Philippine Islands gained 35 per cent and 45 per cent, respectively. Shipments also increased to Australia and Brazil.

Classified by items, weaving machinery stepped up most conspicuously, recording an increase of 70 per cent over the previous year. Spinning machines followed with 43 per cent. There was also a notable activity in locomotive exports, largely due to orders from China and Siam.

Though figures are not yet available, it is anticipated that machinery imports during 1936 will record a further gain over 1934 and 1935, with practically all of the increase coming from the United States. This is largely due to the fact that the inflow of automotive machinery has been boosted by the Automobile Industry Business Law which, among others, provides for free-of-duty importation of manufacturing tools. Out of 102,594,000 yen of imports in 1935, about 38,389,000, or 37 per cent, came from the United States.

Japan Halts Imports

When the Japanese Government took over control of foreign exchange on January 8, importations from the United States were stopped. Not one application for imports into the Empire has been allowed in the time since the exchange control ordinance went into effect. Moreover, there is no indication when trade will be restored. The exchange control edict has not been interpreted by the Japanese Finance Ministry, and American shippers and Japanese export houses in the United States are doubtful that legitimate exports will get early permission to enter the country.

Chicago Machinery Club Elects C. W. Blakeslee

At the annual election of the Machinery Club of Chicago, January 12, Clyde W. Blakeslee of N. A. Strand & Company, was elected president; Clarence Sturgeon, vice-president, and A. W. Smith of the L. S. Starrett Co., secretary-treasurer. The following directors were also elected: Frank Seese of Marshall & Huschart Machinery Co. and A. S. Gray.

House Cleaning Yields 49 Tons of Obsolete Tools

The Diamond Chain & Manufacturing Co. of Indianapolis, a leading exponent of modernization, recently took its own medicine and threw out 49 tons of machine tools which had served their purpose. Although ranking well in efficiency, this company wanted to take full advantage of the marked progress in machine tool development.

Defiance Pressed Steel Opens New Plant at Marion

After an interruption of seven months, the Defiance Pressed Steel Company has resumed manufacturing operations at Marion, Ohio in a new plant, according to an announcement by E. L. Herbolsheimer, president. Last June a $1,000,000 fire ruined the plant then operating in Defiance, Ohio. The company took over the buildings formerly occupied by the Power Manufacturing Company.

Boeing Completes Giant New Assembly Plant

One of the largest unobstructed working areas will soon be used by the Boeing Aircraft Company to assemble nine of its gigantic four-engine Army bombers at one time. Recently completed adjacent to the Boeing Field at Seattle, the plant provides modern erection facilities and working conditions in one room 204 x 304 ft., which rises to a clear height of 35 ft. In all 2,100,000 cu. ft. of unobstructed space are available.

The unit now completed is strictly an assembly shop and the first improvement on a new 28-acre site recently acquired. It will receive parts and partially completed planes from the main plant about a mile away. Motors, wings, fuselage and other airplane parts will be handled inside the assembly shop on a monorail system. In order to keep the working area entirely free of interference from overhead wiring and pipes, the Austin Company, the builders, placed all electric, water, gas, steam and compressed air lines in concrete tunnels underground.

Disston Executive Lays Cornerstone of New Plant

S. Horace Disston, vice-president and general manager of Henry Disston & Sons, Inc., recently laid the cornerstone of a new building at the Tacony, Philadelphia Plant. This structure will be used to house new equipment for turning and grinding the nearly 2,000 rolls required in the steel mill. It occupies a space of 85 x 65 ft.

★Smooth acceleration and deceleration

★Accurate Stepless Speed Control . . . Minimum to Maximum in either direction

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★Flexible Location with Hand, Automatic or Remote Control

★High Efficiency, Low Maintenance

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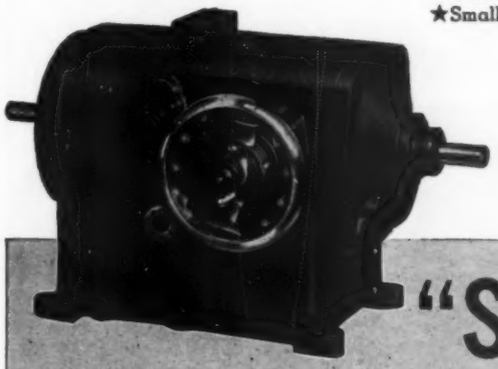

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PERSONALS

RALPH E. FLANDERS, president of the Jones & Lamson Machine Co., Springfield, Vt., has been appointed a member of the Massachusetts Institute of Technology Governing Board, Boston.

HOWARD V. FOLLERT has been elected assistant treasurer of the Collins Co., Collinsville, Conn., manufacturers of axes and picks. The position is a newly created one.

ELLIS T. KNOBLOCH has been made general manager of the Union Iron Works, Erie, Pa., manufacturer of high-pressure steel boilers in addition to his duties as secretary. He succeeds E. H. BREVILLIER, who remains with the company as vice-president.

R. E. OLDS has resigned as chairman of the board of directors of the Reo Motor Car Co. Mr. Olds who has spent more than 40 years in the automobile industry, wishes to "enjoy vacations unhampered by responsibility," and plans an extended trip to California and Australia.

New Works Manager

GEORGE R. MURRAY

GEORGE R. MURRAY, formerly sales engineer of the Chambersburg Engineering Co., Chambersburg, Pa., has been appointed works manager. Mr. Murray has been with the company since 1900. From 1917 to 1919 he was superintendent of production and then had extensive sales experience until his present appointment.

O. T. KREUSSER has been appointed general manager of the Allison Engineering Co., division of General Motors, at Indianapolis.

H. C. MERRITT, general manager of the tractor division, Allis-Chalmers Mfg. Co., Milwaukee, has been elected a vice-president. Mr. Merritt has been in charge of the tractor division since 1926.

M. A. LAUSE has been promoted to assistant factory manager of the Inland Manufacturing Division, General Motors Corp. Mr. Lause will assist in supervising and coordinating the work of the supervisors of the manufacturing division of the plant. His first job was in the machine shop of the Maxwell Motor Co. in 1918 and he became connected with General Motors in 1920.

EMERSON E. BOLLINGER has been appointed supervisor of the standards department to succeed M. A. Lause, who formerly held the position and is now assistant factory manager.

FRED H. COLVIN, editor of *American Machinist*, has been nominated to the Technical Committee on Reamers now being organized as a subcommittee of the Sectional Committee on Standardization of Small Tools and Machine Tool Elements, American Society of Mechanical Engineers.

Put it up to

...on Small Tools and Gages

GAGES, SET-UP and INSPECTION TOOLS ● CONTRACT MANUFACTURE, DESIGN, TOOLING

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Bench Centers
Dial Indicators
Toolmaker's Knees
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Manufacture—to your Blueprints—of Parts or Complete Products
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PIERCE T. WETTER, who for ten years has been on the staff of the American Society of Mechanical Engineers, supervising its technical professional division, has left to become executive vice-president of the American Cutting Alloys, Inc., New York. In his new position Mr. Wetter will have charge of development, manufacture and sale of cemented carbide titanium tips and cutting tools, particularly for the cutting of steel at high speeds. Mr. Wetter also becomes vice-president and assistant treasurer of the American Electro Metal Corp., Lewiston, Maine, manufacturers of molybdenum and tungsten products.

FLOYD A. BEATTY, vice-president in charge of engineering, Lewis Foundry & Machine Co., has been made operating vice-president.

RUDOLPH FURRER, industrial engineer in the manufacturing department, Allis-Chalmers Mfg. Co.'s main plant at Milwaukee, has resigned and has gone back to the A. O. Smith Corp.

FRED N. MIZER, first vice-president of the Bishop & Babcock Co., has been elected president to succeed the late A. G. BEAN.

CONRAD L. OTT, for the past ten years research and executive engineer with the Landis Tool Co., Waynesboro, Pa., has resigned to join his father's company, the Ott Machinery Sales, Inc., Detroit, dealers in used and rebuilt metal-working machinery.

OBITUARIES

JOHN MATTHEWSON, 67, general superintendent of the Alliance Machine Co., Alliance, Ohio, died Jan. 15 following a major operation.

SIDNEY V. STEWART, 54, vice-president and general manager of the Ajax Iron Works, builders of engines and car movers, Corry, Pa., died recently.

WILLIAM A. E. DRESCHER, vice-president of the Bausch & Lomb Optical Co., Rochester, N. Y., died Dec. 30. His association with the company had extended over a period of 60 years and he had been active in its administration until two weeks before his death.

JOHN W. SPRAGGINS, 75, formerly general superintendent of the National Machinery Co., Tiffin, Ohio, died Jan. 8 of pneumonia. A native of England, Mr. Spraggins joined the National company in 1878, became general superintendent in 1896 and retired in 1919.

HUGH R. GRABLE, president and general manager of United Metal Products Co., Canton, Ohio, died Jan. 16 at the age of 46.

WILLIAM H. KILPATRICK, vice-president and general manager of the Chrysler Motor Parts Corp., and a close friend and associate of WALTER P. CHRYSLER, died in San Francisco on Jan. 12.

JOSEPH R. ROYSTON who was connected for 30 years with the American Nut & Bolt Fastener Co., Pittsburgh, as secretary, treasurer and director, died January 4, at the age of 49.

FRANK M. GREGG, founder of the Cleveland Worm Gear Co., in 1912 and president for about ten years, died recently in Florida.

R. H. NOBLE, treasurer of Noble & Westbrook Mfg. Co., East Hartford, Conn., manufacturers of marking machines, died Jan. 15 at the age of 73.

New
1937 Lathes
THE new 1937 Series South Bend Lathes are recommended for the finest and most accurate work in the tool room, machine shop, manufacturing plant, and laboratory. Offered in sizes 9" to 16" swing, in bed lengths from 3' to 14', Motor Drive and Countershaft Drive.
Catalog No. 96 shows the new 1937 Series South Bend Precision Lathes in all sizes and styles. A valuable book for the shop man, engineer, and plant executive. Sent free, postpaid, upon request. A post card will bring it.
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No. 11-A 11" x 4' Quick Change Gear, Countershaft Driven Lathe, complete as shown. Weight 725 lbs.
SOUTH BEND Precision LATHES
Modern Lathes for Modern Industry

MEETINGS

AMERICAN MANAGEMENT ASSOCIATION. Fifteenth annual personnel conference on industrial relations. Benjamin Franklin Hotel, Philadelphia, Pa., February 9-11. ALVIN E. DODD, president, 330 West 42nd St., New York, N. Y.

CHICAGO NATIONAL BOAT & SPORTS SHOW. Navy Pier. Feb. 28-March 7. H. H. ERICKSON, manager, Navy Pier, Chicago.

FIRST NATIONAL AVIATION SHOW. Grand Central Palace, N. Y., Jan. 28-Feb. 6.

KNITTING ARTS EXPOSITION. Commercial Museum, Philadelphia. April 19-23. A. C. RAU, secretary, 327 Park Square Bldg., Boston.

NATIONAL COACH TRAILERS MFGRS. ASSOC. Clearwater, Fla. Jan. 29-Feb. 8. E. H. JUNGCLAS, secretary, 1718 Brockman Ave., Cincinnati.

NATIONAL OIL BURNER & AIR CONDITIONING EXPOSITION. Philadelphia, Pa., March 15-19. C. F. CURTIS, secretary, 30 Rockefeller Plaza, New York.

NATIONAL RAILWAY APPLIANCE EXHIBITION. Chicago, Ill. March 15-18. C. W. KELLY, 910 S. Michigan Ave., Chicago.

PACKAGING EXPOSITION. Hotel Penn, New York. March 23-26. Show managers — Roberts Everett Associates, 232 Madison Ave., New York.

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...AT TOP SPEED
"Barber-Colman" Hobbing Machine
The correct oil film to each individual bearing...
automatically
● A PROLONGED HIGH-SPEED RUN! Any interruption ... any shutdown ... may perhaps mean an entire production schedule shot. Back a few years, you might have had cause to worry. But now, any machine can be equipped with the modern BIJUR AUTOMATIC LUBRICATING SYSTEM. Each bearing kept bathed in its correct oil film ... continuously ... automatically. With BIJUR installed, your mind is free. Lubrication troubles automatically dismissed!
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BIJUR
AUTOMATICALLY Correct LUBRICATION

Foundry Equipment Makers Set Annual Meeting Date

February 2 has been selected for the annual meeting of the Foundry Equipment Manufacturers Association at the Cleveland Hotel. C. E. Hoyt, manager of exhibits, the American Foundrymen's Association will be present to discuss arrangements and facilities of the 1937 convention and exhibit to be held in Milwaukee in May. New directors and officers will be elected.

1937 Metal Show Will Be at Atlantic City

W. H. Eisenman. secretary of the American Society for Metals, has announced that the 1937 National Metal Congress and Exposition will be housed in the Auditorium at Atlantic City, N. J., Oct. 18-22.

Advanced Welding Course Offered in New York

Engineers, designers, architects, production managers, welding supervisors, foremen and operators, and others interested in welding in and around New York City, will have an opportunity of obtaining advanced instruction in the practical and theoretical aspects of arc welding, Feb. 1–5 inclusive. This opportunity is offered by a special course in arc welding design and practice sponsored by The Lincoln Electric Company, Cleveland, Ohio. Meetings will be held in the Port of New York Authority Building, 15th Street and 8th Avenue. The course will be under the direction of E. W. P. Smith, nationally known welding authority of Cleveland, Ohio. Day and evening sessions will be offered. Mornings will be devoted to free consultation service on welding problems. A small fee will be charged for the course.

EXPORT OPPORTUNITIES

* Interested American firms and individuals may obtain the names and addresses of the foreign firms making these inquiries upon application to the Bureau of Foreign and Domestic Commerce, U. S. Department of Commerce, Washington, or any district or cooperative office. Please refer to key number.

Asphalt - roofing-paper-manufacturing machinery. (Purchase.) Prague, Czechoslovakia. *2310.

Candle-manufacturing machinery to make paraffin and stearin candles. (Purchase.) Caracas, Venezuela. *2291.

Canning machines, vacuum process, and can-soldering equipment; and chlorinators for swimming pools. (Agency.) Buenos Aires, Argentina. *2309.

The Quebec Lumber Company, Box 487, Rimouski, Quebec Province, Canada, is in the market for a high-speed planer and matcher.

Theodore Nadon, Rouyn, Quebec Province, Canada, is in the market for complete equipment for sash and door factory.

W. J. Holden Lumber Company, Ltd., 299 First Ave., North Bay, Ontario, Canada, is in the market for complete equipment for a new saw mill plant at Mud Lake, Ontario.

BUSINESS ITEMS

A factory addition providing increased manufacturing facilities has just been completed by the Ajax Flexible Coupling Co., Westfield, N. Y., manufacturers of several types of flexible couplings.

The C. M. Kemp Manufacturing Co., 405 East Oliver St., Baltimore, Md., will build a new one-story steel and brick structure covering 7,200 sq.ft. for the recently expanded welding department for heavy machine assembly. The company manufactures immersion heating products.

The Carboloy Co., Inc., Detroit, manufacturers of cemented carbide tools, dies and wheel dressers, has announced that effective Jan. 1, the Pittsburgh office will supplement its service with an additional district representative, J. E. WELDY, 1107 South 30th St., Birmingham, Ala.

Swartz & White Manufacturing Co., Binghamton, N. Y., manufacturers of flexible shafts, is now in full operation in new and larger quarters at 215 Washington St. The old plant at 243 Water St. was completely destroyed by fire on Nov. 24.

The Lincoln Electric Co., Cleveland, Ohio, has appointed WILLIAM F. FISCHER to the sales staff of its San Francisco office, 866 Folsom St. Mr. Fischer has had five years extensive experience in the welding field.

Carboloy Company, Inc., Detroit, Mich., has appointed FREDERICK W. LUCHT to its engineering staff at Detroit. He was formerly with the McCrosky Tool Corp., Meadville, Pa., and prior to that he was connected with Goddard & Goddard Tool Co., Detroit.

American Machine & Foundry Co. of New Jersey has announced the purchase of the Crawford Oven Co., New Haven, Conn., and according to present plans will continue to operate the business as a separate unit without any change in the personnel.

Fan - Craft Manufacturing Co., Plainville, Conn., will manufacture lighting fixtures and metal specialties in the plant at 37 West Main St., acquired from the Plainville Metal Works, which is moving to new quarters on Farmington Ave.

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The Season's Greetings to All and grateful thanks to our many customers who have passed along the good words in behalf of The Aristocrat of Bearings.
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PATENTS

January 12, 1937

Metal-Working Machinery

Grinding Machine and Method. John Edgar, Rockford, Ill., assigned to Barber-Colman Co. Patent 2,067,176.

Saw Sharpener. Austin C. Elder, Canton, Ohio. Patent 2,067,179.

Hydraulic Double-Acting Metal-Drawing Press. Walter Ernst, Mount Gilead, Ohio, assigned to the Hydraulic Press Corp., Inc. Patent 2,067,265.

Nut Tapping Machine. Herman Goldberg, Chicago, Ill. Patent 2,067,267.

Automatic Forging Machine. Howard F. Johnson, Cleveland, Ohio, assigned to the Champion Machine & Forging Co. Patent 2,067,270.

Welder. Anton Waeschle, Detroit, Mich., assigned to General Motors Corp. Patent 2,067,363.

Machine Tool Including Fluid Operated Feeding Devices. Edward Joslin Kingsbury, Keene, N. H. Patent 2,067,491.

Feeding Apparatus. Edward Joslin Kingsbury, Keene, N. H. Patent 2,067,492.

Machine for Making Wire Elements. Harold I. Danziger, Williamstown, Mass. Patent 2,067,521.

Truing Apparatus for Lapping Machines. Herbert S. Indge, Westboro, Mass., assigned to Norton Co. Patent 2,067,530.

Machine for Hardening Gear Teeth. William E. Sykes, Buffalo, N. Y. Patent 2,067,549.

Metal Cutting Machine. William E. Sykes, Buffalo, N. Y. Patent 2,067,551.

Pipe Threading Machine. William L. Benninghoff, Shaker Heights, Ohio. Patent 2,067,626.

Engraving Machinery. William Taylor, Leicester, England, assigned to Kapella, Limited. Patent 2,067,867.

Processes

Method of Coating Metal. Robert R. Tanner, Highland Park, and John S. Thompson, Detroit, Mich., assigned to the Patents Corp. Patent 2,067,214.

Method of Coating Metal. John S. Thompson, Detroit, and Herman J. Lodeesen, Berkley, Mich., assigned to the Patents Corp. Patent 2,067,216.

Method for Making Electrically Welded Chain Links. Frans Christian Rauwenhoff, Oegstgeest, Netherlands, assigned to Naamlooze Vennootschap. Patent 2,067,342.

Method of Forming Caps. John J. Noll and John J. Williams, Wheeling, W. Va., assigned to Hazel-Atlas Glass Co. Patent 2,067,459.

Drawing Metal. Harry K. Ihrig, Milwaukee, Wis. Patent 2,067,530.

Metal Strip for and Method of Making Spiral Pipe. Edward Hall Taylor, Oak Park, Ill. Patent 2,067,801.

Tools and Attachments

Tantalum Carbide Alloy. Clarence W. Balke, Highland Park, Ill., assigned to Ramet Corp. of America. Patent 2,067,166.

Die for Automatically Working Mechanical Forging Machines for Manufacturing of Seamless Hollow Bodies. Moritz Grunthal, Dusseldorf, Germany. Patent 2,067,568.

Tool for Cutting Threads. William L. Benninghoff, Cleveland, Ohio. Patent 2,067,593.

Welding Rod. Russel Franks, Jackson Heights, N. Y., assigned to Union Carbide & Carbon Corp. Patent 2,067,630.

Welding Rod. Frederick M. Becket, New York, and Russel Franks, Jackson Heights, N. Y., assigned to Union Carbide & Carbon Corp. Patent 2,067,631.

January 19, 1937

Metal-Working Machinery

Engraving and Copying Machine. Kürt Zwick, Munich, Germany, assigned to Friedrich Deckel. Patent 2,067,962.

Wire Straightening Machine. Jacob T. Leech, Beaver, Pa. Patent 2,067,972.

Presser Electrode for Electric Welding Machines. Hans G. Warnke, Detroit, Mich., assigned to Multi-Hydromatic Welding & Manufacturing Co. Patent 2,068,043.

Welding Apparatus. Paul E. Dodge, Detroit, Mich. Patent 2,068,166.

Precision Machine Tool. Léon Seletsky, Geneva, Switzerland, assigned to Societe Genevoise d'Instruments de Physique. Patent 2,068,199.

Wire Fabric Making Machine. Arthur Ernest Blashill, Withington, Manchester, England. Patent 2,068,224.

Grinding Machine. William G. Baldenhofer, Springfield, Ohio, assigned to the Thompson Grinder Co. Patent 2,068,529.

Machine Tool. Max E. Lange, Cleveland Heights, Ohio, assigned to the Warner & Swasey Co. Patent 2,068,552.

Metalworking Apparatus. Shirley D. Murphy and Frank V. Osborn, Indianapolis, Ind. Patent 2,068,564.

Bearing Structure for Rotatable Spindles and the Like. Joseph F. Buhr, Ann Arbor, Mich., assigned to Buhr Machine Tool Co. Patent 2,068,594.

Tool Forming Attachment. Ernst Birger Schüberg and Nils Johan Ludvig Sandström, Goteborg, Sweden, assigned to Aktiebolaget Svenska Kullagerfabriken. Patent 2,068,611.

Machine Tool. Alfred Trosch, Rochester, N. Y., assigned to Consolidated Machine Tool Corp. Patent 2,068,523.

Processes

Surface Hardened Cast Iron Articles of Manufacture. Marie Louis André Babinet, Boulogne-sur-Seine, France, assigned to The Nitricastiron Corp. Patent 2,067,896.

Method of Forming Tube Connections. Herman J. Peters, Columbus, Ohio. Patent 2,067,945.

Tools and Attachments

Press Mechanism. Ronald J. Nordquist, Maplewood, N. J., assigned to American Can Co. Patent 2,067,943.

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Jam Thread Fits

THREAD fits have been given much study, and we now have complete and interesting tables for fits of different classes. But much shop practice makes us question the necessity for much of the refinement we try to attain. Minute variafions in the three elements of lead, diameter and thread angle can play havoc with close tolerances.

A recent visit to a good sized railroad shop included watching two men put the nut on the outer end of the crankpin of a large locomotive. The diameter was about 4 in. with probably 8 threads per inch, giving rather a small helix angle.

The wrench used was about 15 in. long, persuaded by a 3 or 4 lb. hammer at the end. This wrench was coaxed about 120 or more degrees after the nut seemed to seat itself on the pin shoulder. In other words the face of the nut or the threads, "gave" or distorted, about $\frac{1}{64}$ in. in the process of tightening.

This is no criticism of the method of tightening in this case. It may be necessary to insure against loosening in a service that includes more vibration and pounding than many realize. But it tends to make one wonder if what may be called the jam thread fit is not cheaper and just as efficient. Such a thread fit, where the thread angles are definitely varied by about 5 deg., has been used at times in machine work and was proposed some years ago by Chester A. Lord. This plan intentionally forces the metal in the threads to flow and make a good contact. It may be well worth considering where vibration has a tendency to loosen nuts. Some spring clip bolts on automoblies have double thickness nuts to give more thread friction by taking advantage of any error in lead.

Morale in the Shop

STANLEY BALDWIN

CAREFUL observance of the following rules will enable your workmen to put in their time without the need for additional space in which to store the product. A proper galley-slave feeling will also be fostered among the men as a result.

1. Provide inadequate equipment and "bawl" out every man caught in using makeshift methods.

2. Do not keep windows clean or provide good lighting facilities; workmen may get in the habit of doing accurate work if they are enabled to see a line.

3. Do not provide metal racks at the drill presses or other machine tools; machine vises and other attachments look better and retain their accuracy longer by being kicked about the floor.

4. Do not have sufficient help in the toolcrib; a long line of high-priced mechanics at the toolcrib window looks business like.

5. Back up your pet workmen in the practice of tying up two or more machines at one time; you may have a chance to discharge someone for fighting about it.

6. Encourage the practice of carrying off special wrenches belonging to machine tools for use on some distant job; operators might get a chance to relax while hunting for them.

A little thought applied to conditions in your shop will probably suggest other ways to cause your workmen to curse the circumstances that compel them to go to the shop each morning without enthusiasm.

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Decimals to Fractions

W. R. GARCELON
Industrial Mathematics Instructor, Vallejo High School

Two methods for the sub-division of the standard inch are in use by American industry. They are: first, the British method of dividing the inch into halves, quarters, eighths, sixteenths, thirty-seconds and sixty-fourths; and second, the decimal system in which the inch is divided into tenths, hundredths, thousandths and ten thousandths. Thus, a very confusing situation arises at times because the shop man must use either one or the other system, or both at the same time in order to get the job done.

He may use a conversion table, or table of common fractions having decimal equivalents. This practice has its limitations in that it is difficult at times to arrive at the closest 64th or closest 32nd. In my method no table of decimal equivalents is necessary. The result is correctly and quickly obtained.

Consider the inch. It can be divided into common fractions of

$$\frac{16}{16}\ \frac{8}{8}\ \frac{64}{64}\ \frac{32}{32} \text{ or}$$

$$\frac{10}{10}\ \frac{100}{100}\ \frac{1,000}{1,000}\ \frac{10,000}{10,000}$$

It is true that a certain number of units of one system will equal a number of units of the other system. For example, 3/64 will have a corresponding value in 1,000ths. To change a decimal to a common fraction, proceed as follows:

To change the decimal 0.627 to the closest 64th. Multiply 0.627 by the denominator of the common fraction desired, and the answer is 40.128.

$$\begin{array}{r} 0.627 \\ 64 \\ \hline 2508 \\ 3762 \\ \hline 40.128 \end{array}$$

This result is read as $\frac{40.128}{64\text{ths}}$

It means that 0.627 contains 40 entire sixty-fourths, plus 0.128 of another sixty-fourth $\frac{(0.128)}{64}$ Since $\frac{0.128}{64}$ is less than half of a sixty-fourth it is discarded. The value then of $0.627 = \frac{40}{64} = \frac{5}{8}$

By applying the following rules any decimal may be changed to the closest sixty-fourth, thirty-second, sixteenth or eighth.

1. Decide what common fraction is wanted.
2. Multiply the decimal by the denominator of the common fraction required.
3. Point off the required decimal spaces as

$$\begin{array}{r} 0.625 \\ 64 \\ \hline 2500 \\ 3750 \\ \hline 40.000 \end{array}$$

4. The figures to the left of the decimal point are the whole number of units desired.
5. The figures to the right of the decimal point indicate the fractional

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part of the unit. If this fractional part is 0.5 or more, add one entire unit to the whole number of units and discard the fraction.

6. If the fractional part is less than 0.5, discard it and leave the whole number of units as they are.

Hand Ground Drills

Drill grinding is still a much disputed question. Advocates of hand grinding point to the practice of drill makers themselves in grinding at least some sizes of drills by hand. One point in this connection is too frequently overlooked. With a new drill the grinder has the turned cone or point as a guide, but this is lost after the first grinding.

Many shops use the machine on all large drills, some going down to ¼-in. drills. It has been claimed that few machines can not grind small drills satisfactorily, although one builder at least feels that this is now possible. Grinding drills by machine presupposes that drills are exchanged for sharp ones, and that they are ground in as large lots as possible. This practice has become common in many shops. In one large shop, however, the routine is entirely different.

The workman brings the dull drill to the grinding room and waits for it to be ground. The grinder is an old hand and an expert. Although it is a large shop he knows every drilling machine and the kind of work it handles. For steel, cast iron, brass or plastics, the drills are ground accordingly, and in remarkably short time. He uses no gage, but checks each drill point with his eye, holding it toward a strong lamp with a frosted bulb. The sizes vary widely, making it impracticable to use a grinding machine with this method of "grinding while you wait."

The advisability of this policy may be open to question. Interruption of production while drills are being taken to and from the grinding room, as well as the grinding time, must be considered. This loss must be balanced against the cost of extra drills that are always available in good condition.

Perhaps a more important consideration is that of the personal element. This drill grinder is exceptionally good, and his work has been satisfactory for a long time. But he cannot always be on the job for day and night shifts. Then, too, there is always the possibility of accident or illness, which will interrupt the work even if he recovers. And "standby" men are more difficult to secure than standby machine equipment.

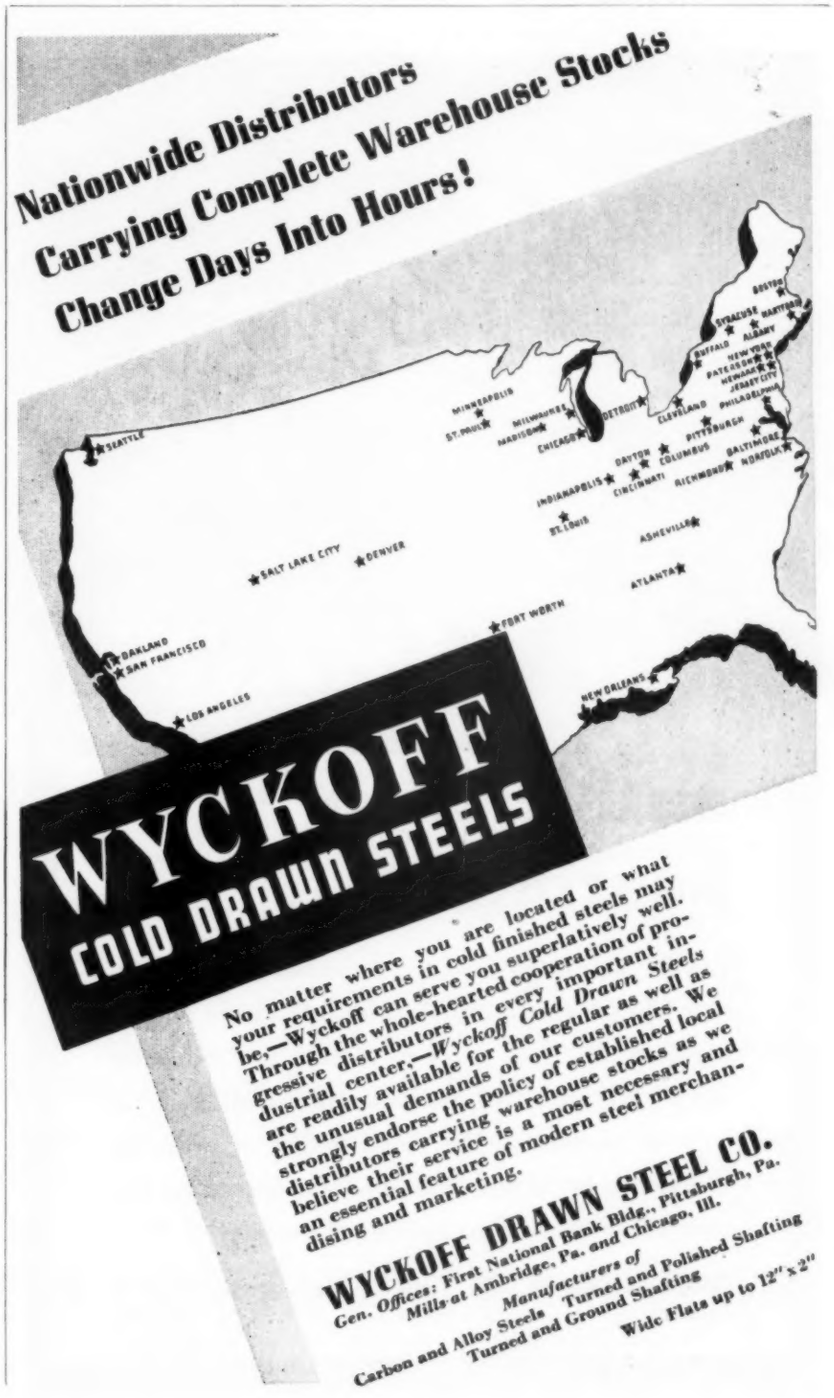
Eight Points About Oil

Oil isn't just "oil" any more. It's a substance that, according to oil experts, must be considered from eight different angles. These eight points are summed up by the Continental Oil Company as follows:

Load-carrying capacity: The ability to carry the highest possible load at the highest probable temperature with resultant low heat formation.

Metal wear: The oil must not only carry high loads with low friction, but must do so without appreciable metal wear.

Corrosiveness: Neither the agent nor its decomposition products should be corrosive to any metal with which it will come in contact.



Oiliness: The ability of a lubricant to operate under boundary or thin-film conditions with low friction and a minimum supply of oil for an indefinite period.

Corrosion protection: The product must not only be non-corrosive itself, but should form a strongly adsorbed film on metal surfaces which will protect them from the corrosive products of combustion and of oxidation of the mineral oil.

Stability: The addition agent must not only be stable under the highest temperatures reached, but it must not accelerate the oxidation of the mineral oil. It should act preferably as an inhibitor.

Physical characteristics: Its physical characteristics, such as volatility, flash point, pour test, solubility, etc., must not be detrimental to the required specifications of the mineral oil.

Toxicity: The addition agent must be neither toxic nor obnoxious.

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TRADE PUBLICATIONS

ADJUSTABLE DIEHEAD. Bulletin EJ4-1, published by the Gemotric Tool Co., New Haven, Conn., describes the Style EJ4 solid, adjustable diehead which will cut threads from $\frac{1}{16}$ to $\frac{1}{4}$ in. in pitches of 20 threads per in. or finer. Chasers are removable for replacement or change in size.

BATTERY HANDLING. Bulletin No. 205, published by the Electric Storage Battery Co., Allegheny Ave. and 19th St., Philadelphia, describes various methods of handling electric industrial truck and tractor batteries. Diagrams and photographs illustrate accepted methods of quickly changing batteries.

BROACHING MACHINES. Colonial high-speed "pull up" heavy-duty power broaching presses and single- and dual-ram surface broaching machines are described in bulletins offered by the Colonial Broaching Co., 147 Jos. Campau Ave., Detroit. Each type of machine is described in a separate bulletin. Specifications are listed for the various models of each type.

CALIPERS AND GAGES. Glogau & Co., 538 South Clark St., Chicago, Ill., are mailing leaflets describing their various vernier calipers and other gaging instruments.

CHAIN. Three bulletins describing Rex roller chain, Griplock chain and Z-Metal chain have been published by the Chain Belt Co., Milwaukee, Wis.

CHROMIUM PLATING. A 16-page booklet published by the Master Chrome Service, Inc., 5609 Herman Ave., N. W., Cleveland, Ohio, describes their facilities for chrome plating machine parts and tools. It also explains to some extent the process of chrome plating as applied to this field.

ELECTRIC MOTORS. Single-phase motors of the brush lifting, repulsion-start, induction type are described in an 8-page bulletin published by Century Electric Co., 1806 Pine St., St. Louis, Mo.

FIBER DATA BOOK. A 28-page engineering data book for 1937 is offered by the Spaulding Fibre Company, Inc., 310 Wheeler St., Tonawanda, N. Y. Data on hard vulcanized fiber, laminated phenolic Spauldite and Armite insulation are included.

FORGED SOCKET SCREWS. The Holo-Krome Screw Corporation, Hartford, Conn.. has issued a 38-page catalog giving tabulated data and describing the Holo-Krome Fibro-Forged socket screws.

FORGINGS. The Champion Machine & Forging Co., 3695-3725 East 78th St., Cleveland, has published a folder describing their facilities for producing steel forgings. Methods of inspecting and testing forgings are described.

GRINDING WHEELS. Safe Practices Pamphlet No. 13, published by the National Safety Council, Inc., 20 North Wacker Drive, Chicago, is an illustrated bulletin dealing with methods of promoting and insuring safe use of grinding wheels. Tables included in this booklet give recommended sizes for flanges and protective hoods.

MACHINE SHOP SAFETY. Safe Practices Pamphlet No. 39, published by the National Safety Council, Inc., 20 North Wacker Drive, Chicago, discusses accident hazards encountered in the ordinary machine shop and offers suggestions for the elimination of unsafe practices and conditions.

MOTOR DRIVE UNIT. A mailing folder offered by Stark Tool Co., Waltham, Mass., describes and illustrates the Stark motor drive unit for bench-type milling machines and lathes. This unit is designed for under-bench drives.

PILLOW BLOCKS. Specifications and installation data on six types of self-aligning and self-lubricating pillow blocks, including a new universal-position model, are contained in the 1937 catalog issued by Randall Graphite Products Corp., 609-613 West Lake St., Chicago. This catalog is designed for the convenience of engineers and maintenance supervisors.

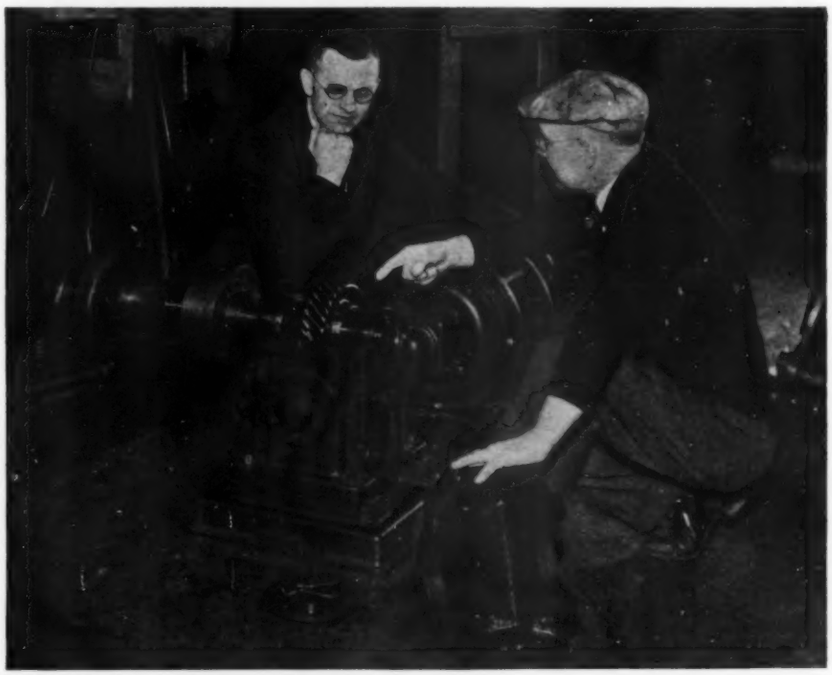
POWER TOOLS. Catalog No. G-7 offered by Walker-Turner Co., Inc., Plainfield, N. J., lists and describes the 1937 line of "Driver" tools. The Series 500, 700 and 900 tools are described and illustrated.

ROBINSON - PATMAN SYMPOSIUM. Forrest B. Maketchnie, Inc., 84 State St., Boston, has published a special edition of the Robinson-Patman symposium including highlights from the court stenographer's report and other comments on the Bird & Son, Montgomery-Ward hearings before the Federal Trade Commission. The price is $5 postpaid.

RUBBER GOODS. "A Buyer's Guide to Diamond Mechanical Rubber Goods" is the title of a 27-page illustrated catalog issued by the Diamond Mechanical Division of The B. F. Goodrich Co., Akron, Ohio. This catalog contains illustrations and descriptions of more than fifty mechanical rubber products and accessories, widely used in industry.

SAFETY. An interesting picture of accident prevention work from the viewpoint of the presidents of 23 large industrial organizations is given in the booklet "Safety" recently published by the National Safety Council, 20 North Wacker Drive, Chicago, Ill. The subject of safety is presented in facts and figures from an economics angle.

SENSITIVE DRILLS. An 8-page bulletin, No. 2730 C, offered by the Buffalo Forge Co., 448 Broadway, Buffalo, N. Y., describes the redesigned No. 16 sensitive drilling machines. Specifications are listed.



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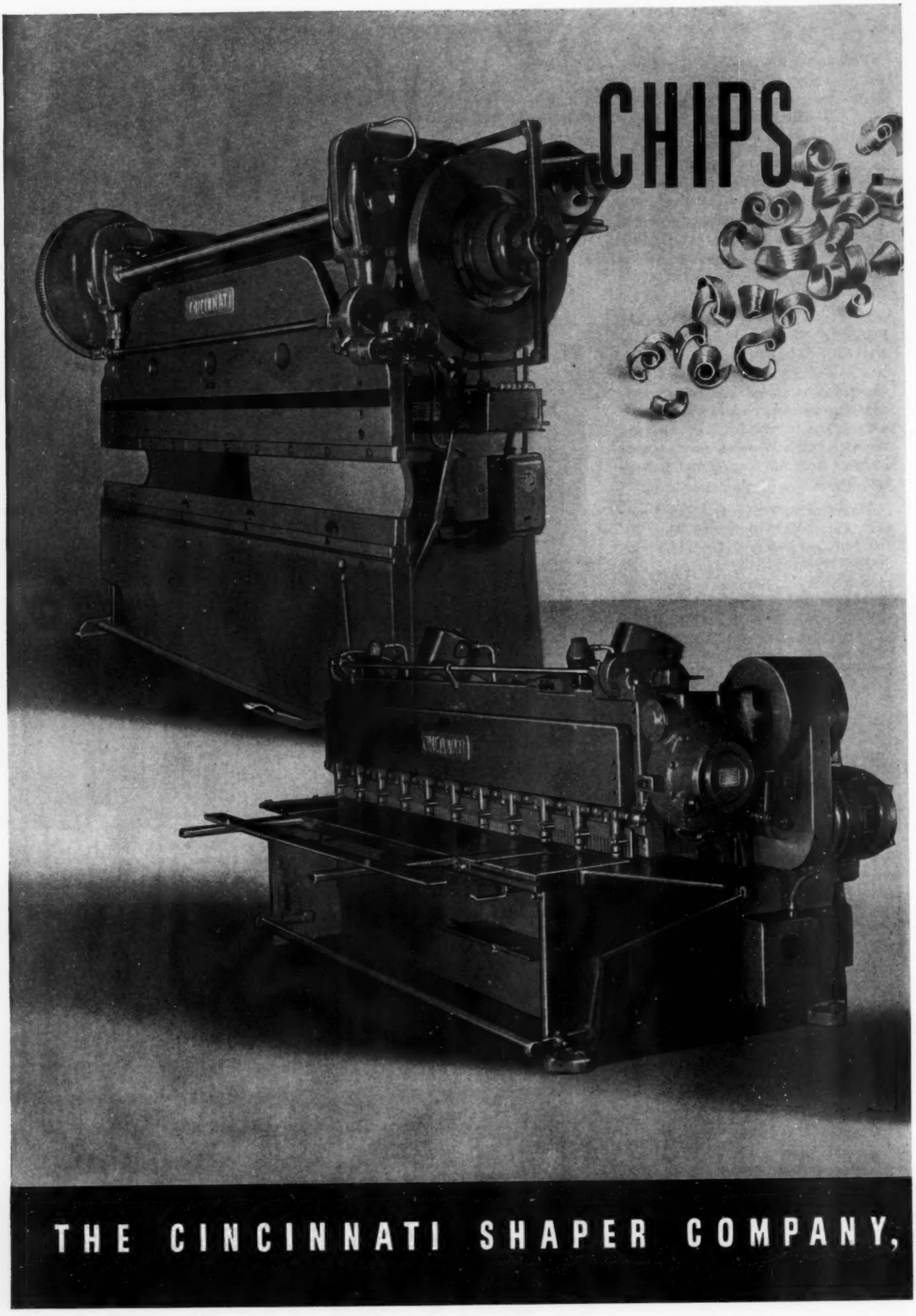
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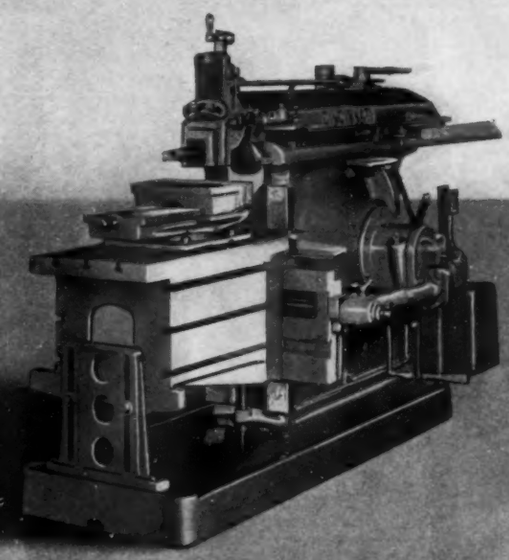

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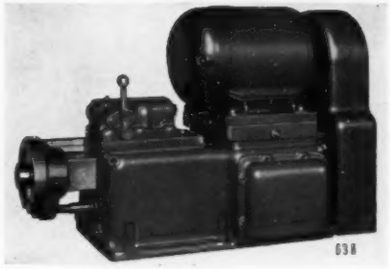
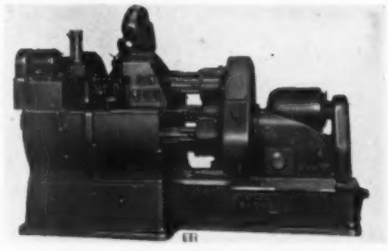


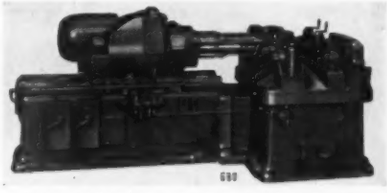
Square Ram Hydraulic Units in Three Sizes. SR-2 Shown Above.

Established in 1872, the W. F. and John Barnes Company pioneered in building high grade machine tools for boring, drilling, and similar metal working operations. The Company has progressed steadily and has attained outstanding leadership in the application of hydraulic pressure to machine tool actuation. All Barnes Hydraulic Units, Pumps, Valves, and Controls are of our own exclusive design and manufacture.

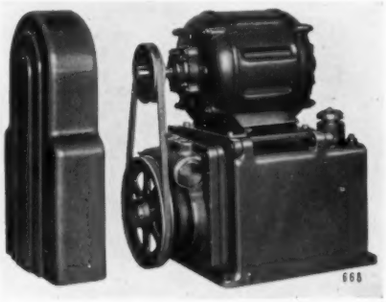
Noted for high accuracy, production, and economy; our products include standard Square Ram Hydraulic Units, in three sizes; standard Vertical Drilling Machines, in two sizes; a wide variety of Boring and Drilling Machines composed of standard or semi-standard units; and single-purpose machines of special design throughout for boring, drilling, reaming, and similar operations. Inquiries about our products are invited. Reliable production and cost estimates prepared promptly on receipt of suitable data.



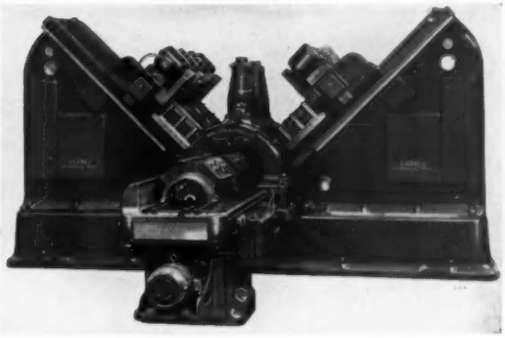
Horizontal Single-End Machine, With Hydraulic Indexing Fixture, for Boring and Drilling Transmission Cases.



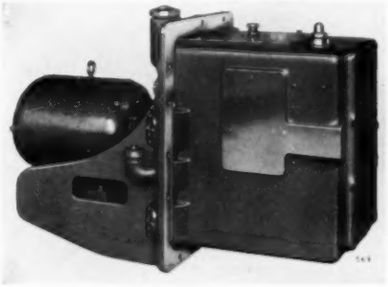
Single-End Machine for Reaming Transmission Cases Bored and Drilled on Machine Noted in Paragraph Above.



Hydraulic Indexing Unit. For Indexing Fixtures, Clamping Work-Pieces, and Similar Functions.

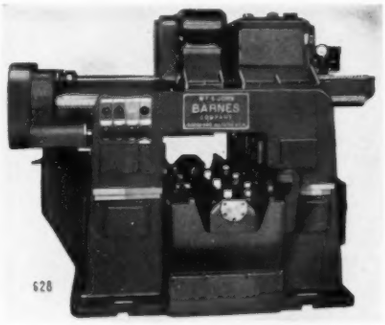


Left—Eight-Spindle Machine for Highly Accurate Single-Point Boring of V-8 Cylinder Blocks. Has Automatic Hydraulic Operating Cycle, Hydraulic Indexing, and Hydraulic Work-Clamping.



"F.T." Type Hydraulic Unit for Rapid Traversing and Feeding Machine Elements.

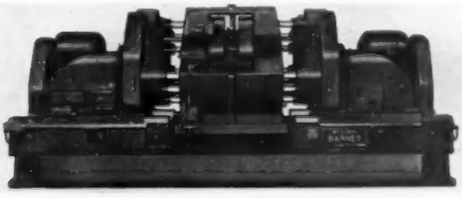
Below—Hydraulically Actuated Machine for Single-Point Precision Boring Crankshaft Bearing Seats in V-8 Cylinder Blocks.

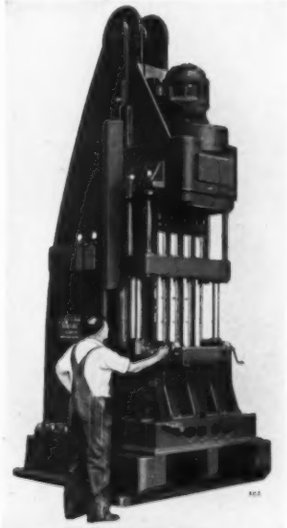


Below—A Heavy-Duty Vertical Cylinder Boring Machine.

Above—Machine in Which Six SR-5 Hydraulic Units are Mounted for Drilling Throws in Crankshafts.

Below—Two Barnes Hydraulic Sliding Heads for Machining Universal Joint Yokes.





ESTABLISHED 1872

W. F. & John BARNES Company

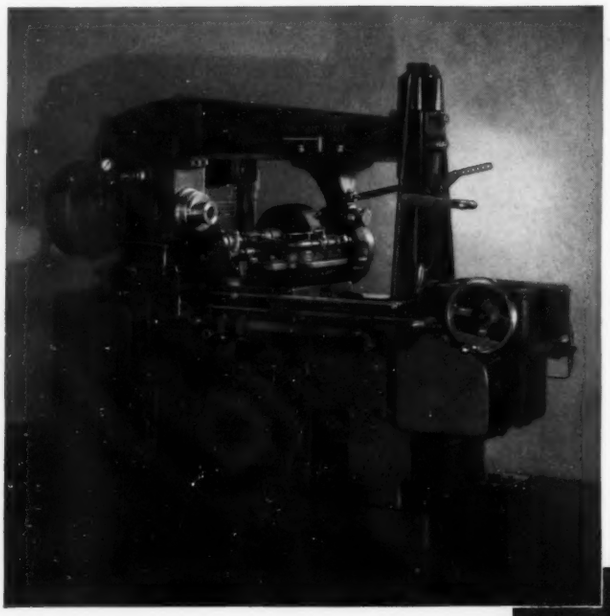
CONVERTIBLE HYDRAULIC MACHINE TOOLS

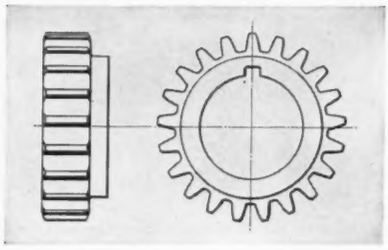
ROCKFORD, ILLINOIS, U.S.A.

ACCURATE, POWERFUL, ECONOMICAL BORING and DRILLING MACHINES

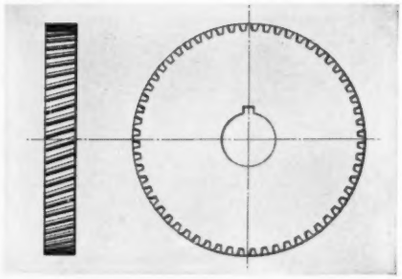
MADE IN ROCKFORD, ILLINOIS, U. S. A.

INCREASE YOUR 1937 PROFITS

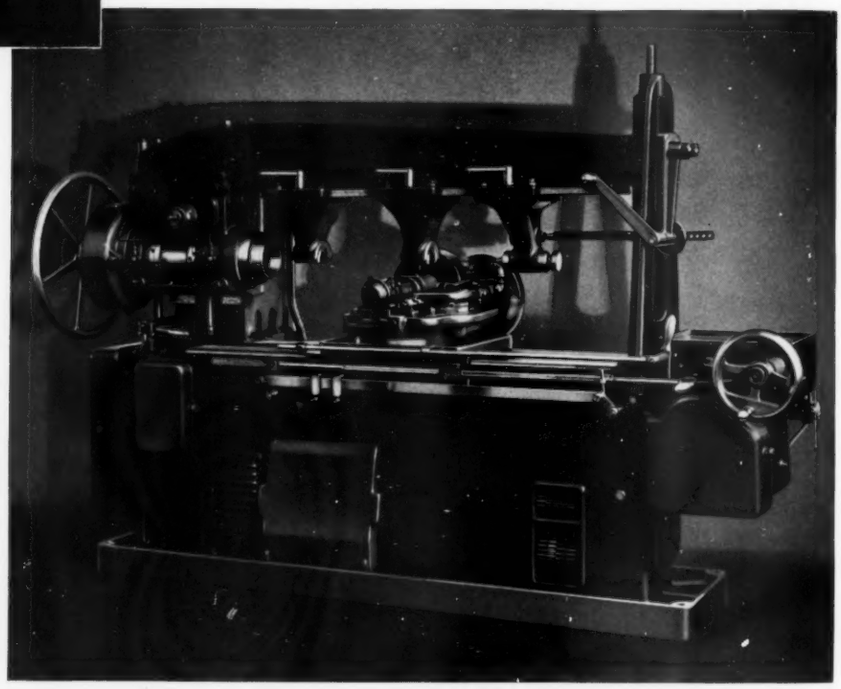


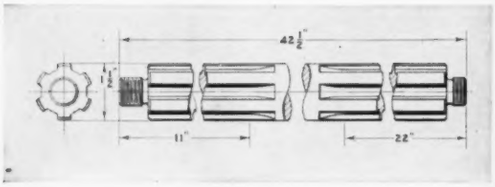


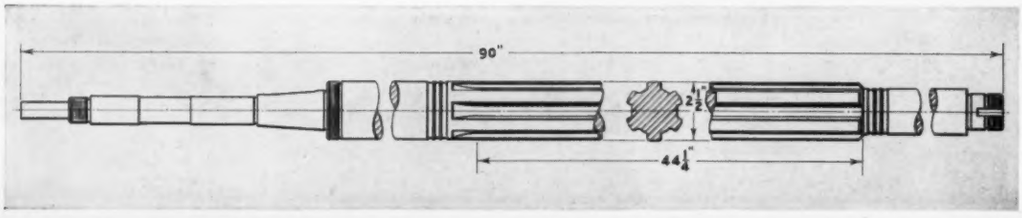
Standard-length Type A Hobbing Machine shown at left. Typical gears hobbed are sketched above and at right. Complete data on request.



HOBBING MACHINES







Long-bed Type A Hobbing Machine illustrated above. Line drawings indicate some of its possibilities. Write for production figures and other data on this work—or yours.

BARBER-COLMAN COMPANY

MADE IN ROCKFORD, ILLINOIS, U. S. A.

USE B-C HOBBING EQUIPMENT

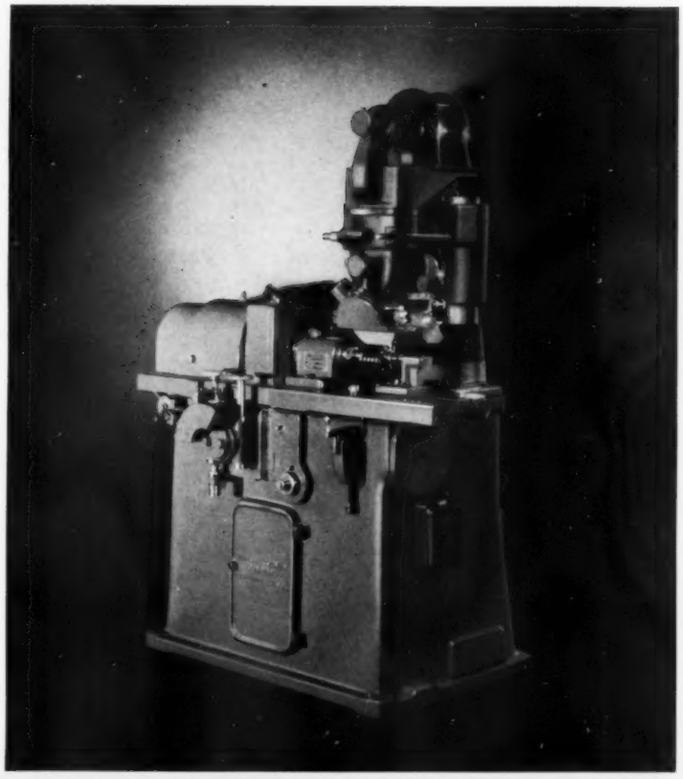
HOBS

Complete Hobbing Service—Barber-Colman Hobbing Service includes Hobbing Machines, Hobs, Hob Sharpening Machines, Engineering and Inspection Services. It is complete, from consideration of your production problems—to inspections that insure maximum effectiveness of your hobbing equipment continually after installation.

Hobbing Machines—No. 3 Standard and Precision, for small hobbing; No. 12 and Type A for medium-sized work; Type T for taper splines and general-purpose hobbing. Separate bulletins for each machine describe details, specifications and accessories. Copies of bulletins will be sent promptly on request.

Hobs—For maintaining extremely close limits on all kinds of hobbing, processed in lots of any size, Barber-Colman Ground Hobs are unexcelled. For holding ordinary commercial limits, B-C unground Hobs are entirely satisfactory, most economical. Standard sizes in both types carried in stock, specials designed and made to order promptly. Rigid maintenance of highest standards of design, materials, workmanship, heat treatment, and inspection of B-C Hobs results in universal recognition of their excellence.

HOB SHARPENING MACHINES



Hob Sharpening Machines—Barber-Colman Hob Sharpening Machines do a far better, more accurate, more uniform, and faster job than any hand-operated grinder can be expected to do. Set-up is simple, indexing accurate, feed-rate and depth of grind positively controlled. A few simple adjustments prepare the machine for sharpening straight- or helical-gashed hobs or formed cutters of any make, with radial tooth-faces or rake. Uniformly accurate sharpening then proceeds automatically and the operator then can run other machines if desired. For greater accuracy, higher production and longer hob life use Barber-Colman Hob Sharpening Machines.

BARBER
B-C
COLMAN

PRODUCTS

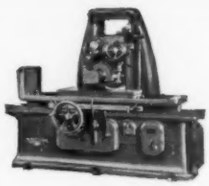
MILLING CUTTERS, HOBS, HOBBING MACHINES, HOB SHARPENING MACHINES, REAMERS, REAMER SHARPENING MACHINES, SPECIAL TOOLS

General Offices and Plant

ROCKFORD, ILLINOIS, U. S. A.

MADE IN ROCKFORD, ILLINOIS, U. S. A.

MATTISON
HIGH-POWERED
PRECISION SURFACE GRINDER

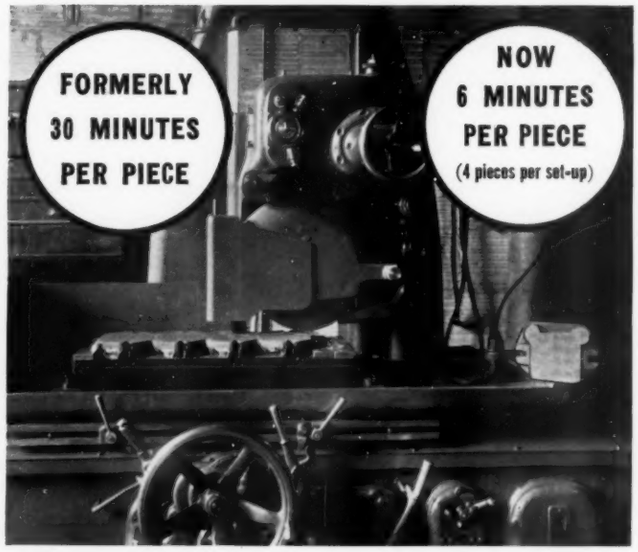


80% TIME REDUCTION

THESE cast iron die shoes were previously finished on a shaper requiring 30 minutes per casting. Now the Mattison Precision Surface Grinder removes .020" from each side in 6 minutes per piece, (4 shoes per setup, as illustrated), eliminating the shaper operation entirely, providing greater accuracy and finer finish.

The possibilities of the Mattison Surface Grinder as a method for reducing cost of operation are truly remarkable, 50% to 90% being reported by a large majority of users.

Let us have samples or drawings of your surface grinding operations; or work that you should grind but are now finishing by other methods, Mattison engineers will gladly tell you what can be done to reduce costs and increase profits for you by means of a Mattison Grinder.



MATTISON MACHINE WORKS—ROCKFORD, ILLINOIS

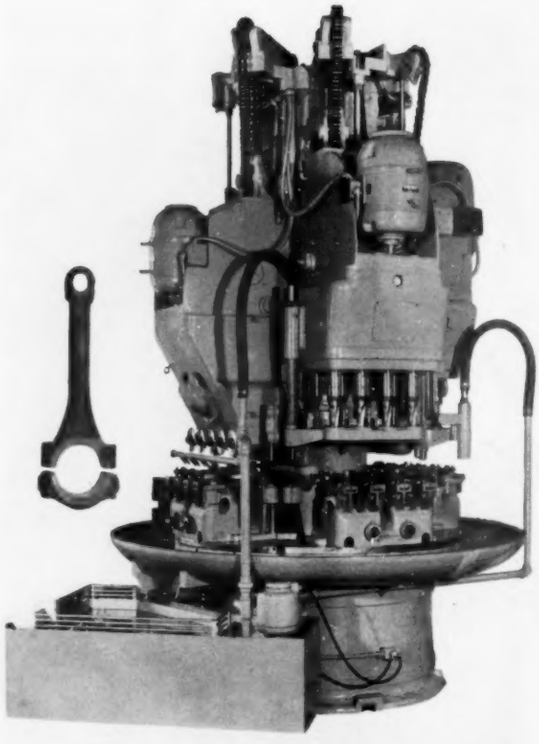
GREENLEE

Vertical Indexing Machines Provide Economical Production

Large savings are possible in the machining of castings and forgings for automobile and other large-production parts by taking advantage of the speed and accuracy of Greenlee Vertical Indexing Machines for performing such operations as drilling, reaming, threading, tapping, spot-facing, sawing and milling. Parts for which they have been built include connecting rods, steering spindles, ring gears, flywheels, gear cases, generator frames, generator pole pieces, etc.

The Indexing Machine shown here is equipped with three self-contained hydraulic units for drilling and reaming the crank and pin holes, milling the bolt bosses and sawing off the caps of an automobile connecting rod. Each fixture holds four connecting rods, so that four are completed at each index of the table. Production is very high, because there is no time lost between operations; accuracy is constant and continuous.

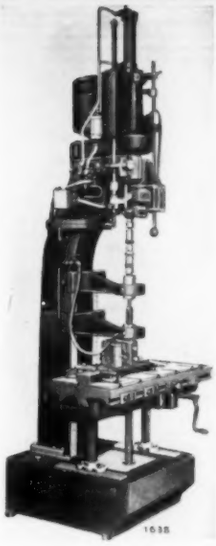
The application of this type of machine is not confined to automotive work. Any similar parts made in quantity can be machined by this method and show large savings in the cost of production. You have only to ask for further information and send us blue prints for a preliminary estimate.



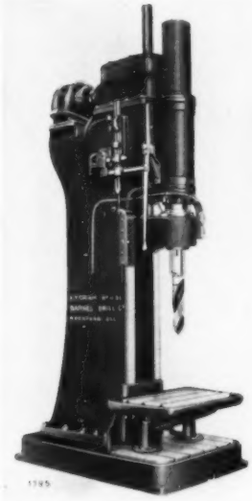
A Greenlee Four-Position Indexing Machine for Machining Automobile Connecting Rods.

GREENLEE BROS. & CO. - ROCKFORD, ILLINOIS

MADE IN ROCKFORD, ILLINOIS, U. S. A.

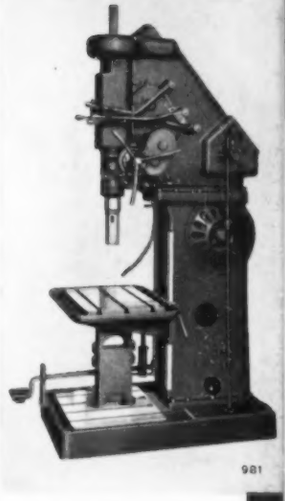


No. 194 Honer, at left. Unexcelled for finishing cylinders, bushings, gear-bores, and other work from ¾" to 4" inside diameter.

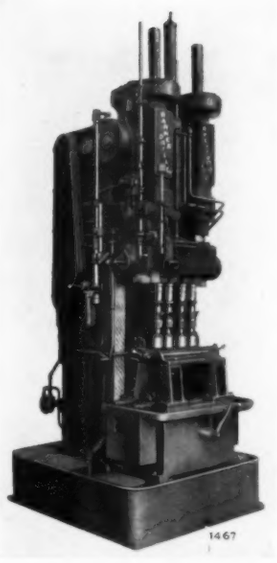


Hydram Heavy Duty Driller, below at left. Made in three standard sizes. Tremendously powerful. Has variable hydraulic feed directly over center of tools.

Directly below is a group of Hydram High Production Units passing final inspection by customer's representatives. Hydrams can be equipped with Multiple Spindle Auxiliary Heads and Indexing Tables for a variety of mass production operations.

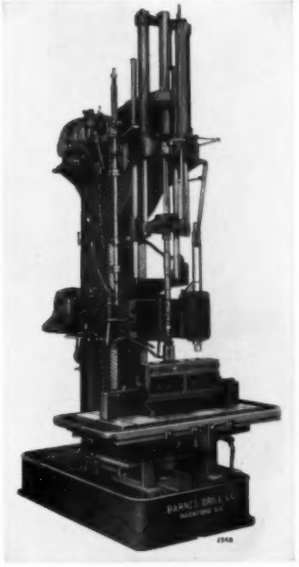


No. 242 Driller, above. Has quick change speeds and feeds, for variety of high-production manufacturing. Built in two smaller sizes, 221½ and 201¼. Also single-purpose types and sizes.



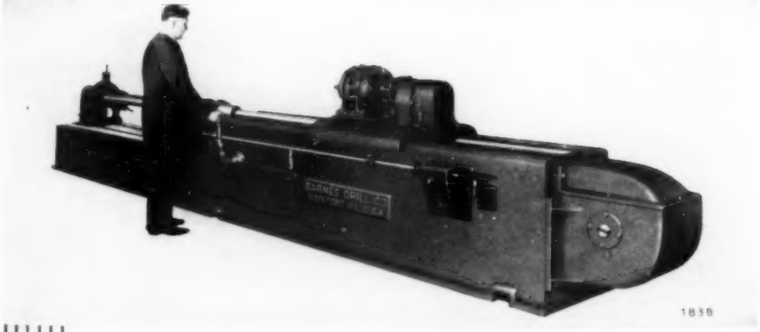
No. 214 Honer, above. For honing two to eight cylinders simultaneously. Cuts cost, increases production, improves product.

At right, Combination Boring and Honing Machine. Built in two sizes. Accurately mounted boring spindle can be swung aside to permit honing without moving work-piece. Especially suitable for small-lot manufacturing and reconditioning.



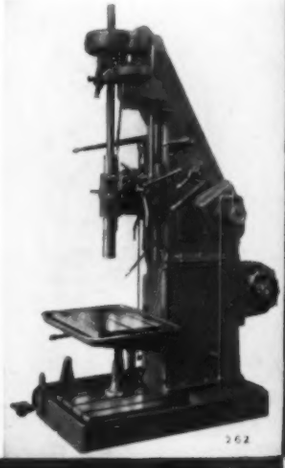
SELF-OILING, ALL-GEARED DRILLERS .. HYDRAULIC HONERS

Illustrated on this page are representative Self-Oiling, All-Geared Drilling Machines and Hydraulic Internal Honing Machines. In addition to these we build other standard sizes, and special combinations for a wide variety of drilling, and any internal honing whatever. We shall be glad to send promptly on request descriptions, specifications, and prices on any or all of our standard machines; and to prepare proposals on built-to-order equipment on receipt of your drawings and data. Write today for latest information on Self-Oiling, All-Geared Drillers and Hydraulic Honers. If you want the bulletins in a binder please ask for Catalog A.



Horizontal Honer, at left. For honing work too long to handle vertically. One of our latest honer developments. Has great possibilities for improving accuracy, quality, and reducing cost of finishing bores that have hitherto been difficult to machine to desired accuracy.

No. 262 Driller, at right. A wide range general purpose machine of great merit. Very popular for airplane motor building, tool shops, and general manufacturing.



BARNES DRILL CO. 830 Chestnut Street ROCKFORD, ILLINOIS

MADE IN ROCKFORD, ILLINOIS, U. S. A.

ANNOUNCING

The Sundstrand Automatic No. 2 ELECTROMIL

Send for this
CIRCULAR

New illustrated circular containing complete information on the No. 2 Electromil; including features, advantages, set-ups, cycles and specifications; will be mailed postpaid promptly on request. Write, today, for a copy.

A small Rigidmil with complete electrical control. For high-speed operation on parts of adding machines, typewriters, sewing machines, household appliances, electrical apparatus, firearms, small machine parts, tools, and similar products. The No. 2 Electromil is lightning fast, highly accurate, extremely adaptable, easily set-up for a wide variety of cycles. Will "climb cut" or conventional mill separately or in combination. Has excellent possibilities for increasing production and cutting costs on all work within its capacity. Investigate. Write today for details.

SUNDSTRAND MACHINE TOOL CO.
2533 Eleventh Street, ROCKFORD, ILLINOIS

RIGIDMILS - STUB LATHES
3-Wheel Tool Grinders - Centering Machines
Hydraulic Operating Equipment - Special Machinery

SUNDSTRAND MACHINE TOOL CO. S ROCKFORD ILLINOIS U.S.A.

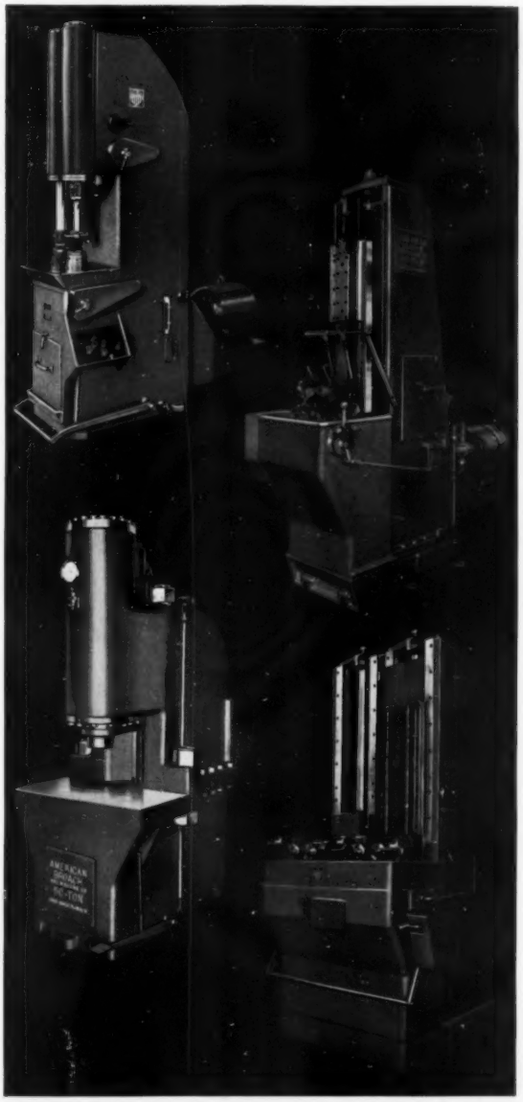
MADE IN ROCKFORD, ILLINOIS, U. S. A.

AMERICAN BROACHING

• A COMPLETE SERVICE with Nation-Wide Representation

A Division of SUNDSTRAND MACHINE TOOL CO. ROCKFORD, ILLINOIS, U.S.A.

Typical American Broaching Machines are shown at right. Detailed information about these, and others in our complete line, supplied promptly on request.



Machines—A complete line of standard and special machines, vertical, horizontal, and rotary, automatic and semi-automatic, for every practical internal, external or surface broaching operation. In addition, a wide variety of Hydraulic Presses for straightening, bending and assembling.

Broaches—With a personnel having more than 33 years experience in broaching, a Tool Department specially equipped for broach manufacture and staffed by specialists, we design and manufacture broaches, of any size or shape, that are unexcelled for accuracy, durability and economy. Certain standard broaches are carried in stock. Prompt deliveries on specials.

Fixtures—Our engineers are expert in designing work-holding devices that meet the most rigid requirements for accurate locating, quick, secure clamping, and completely successful operation.

American Broaching cuts costs, increases production, delivers complete units ready to run and accepts entire responsibility for machines, broaches, and fixtures.

Representatives—We have carefully selected, competent, trustworthy representatives in the territories listed below (names and addresses supplied promptly on request). Consult these men freely on all broaching problems, or write us direct if you prefer.

Boston, Mass.	Milwaukee, Wis.
Buffalo, New York	Minneapolis, Minn.
Chicago, Illinois	New York City
Cincinnati, Ohio	Philadelphia, Pa.
Cleveland, Ohio	Pittsburgh, Pa.
Dayton, Ohio	St. Louis, Mo.
Detroit, Mich.	Seattle, Wash.
Indianapolis, Ind.	Syracuse, N. Y.
Los Angeles, Calif.	Toledo, Ohio

Windsor, Ontario, Canada

AMERICAN BROACH & MACHINE COMPANY, Ann Arbor, Michigan, U. S. A.

BROACHING MACHINES, PRESSES, BROACHING TOOLS, SPECIAL MACHINERY

A Division of

SUNDSTRAND MACHINE TOOL CO. ROCKFORD, ILLINOIS, U. S. A.

SHAPER-PLANERS

Hy-Draulic

PLANERS ● SHAPERS

Shown at right are the four types of Hy-Draulic Machine Tools. These have the overwhelming advantages of hydraulic drive and hydraulic feeds, some of which are indicated below.

Constant Cutting Speed and Pressure— A direct-connected standard constant speed motor drives the hydraulic unit which provides cutting power infinitely adjustable through several ranges but absolutely constant at any one setting. Cutting speed rises almost instantly to the selected rate, remains uniform throughout the stroke.

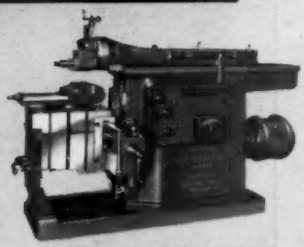
High Return Ratio—Return ratios are independent of cutting speeds and much higher than any obtainable through rigidly connected mechanical means. Reversals are shockless.

Fine Finish, High Accuracy— In the Hy-Draulic drive there are no gears, racks, links, or joints to transmit marks to the work. Finish is superior to any hitherto obtainable; is smooth, uniform, without blemish. Work produced on these machines meets most exacting requirements for accuracy

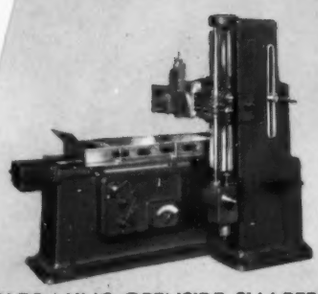
High Production—In addition to the advantages indicated above, infinite adjustability of cutting speeds and feeds enables operators to secure easily the exact combination to obtain maximum production. Set-up is easy and rapid. Controls are few and centralized, anyone can operate them.

Longer Tool Life— The Hy-Draulic drive lengthens tool life between grinds an average of 50%.

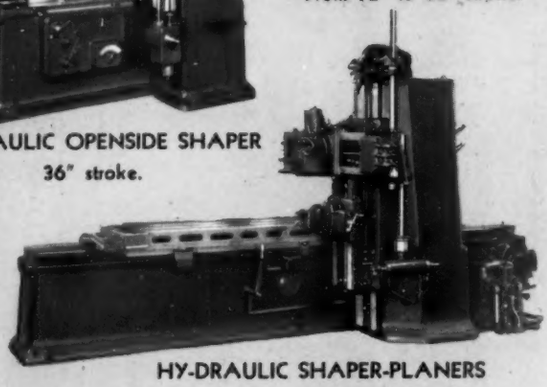
Longer Machine Life— Simplicity and ruggedness of design, relatively small number of moving parts, complete lubrication, high grade materials and workmanship throughout, all combine to provide longer machine life with lower operating and maintenance cost. Investigate.



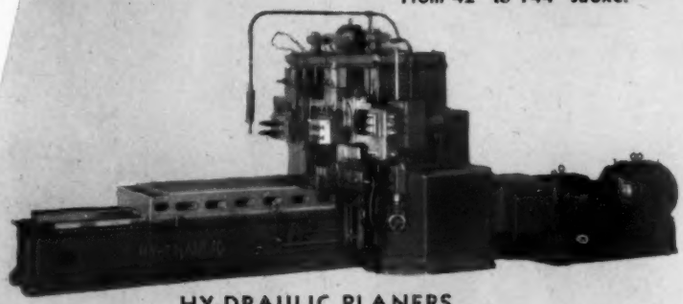
HY-DRAULIC SHAPERS
From 12" to 32" stroke.



HY-DRAULIC OPENSIDE SHAPER
36" stroke.



HY-DRAULIC SHAPER-PLANERS
From 42" to 144" stroke.



HY-DRAULIC PLANERS
Double housing type shown,
Openside also available.

Hy-Draulic

Shapers · · Shaper-Planers · · Planers

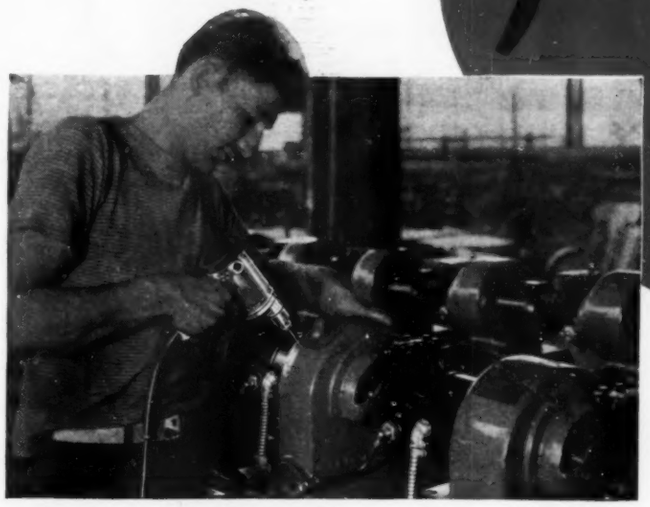
ROCKFORD MACHINE TOOL CO.

ROCKFORD, ILLINOIS, U.S.A.

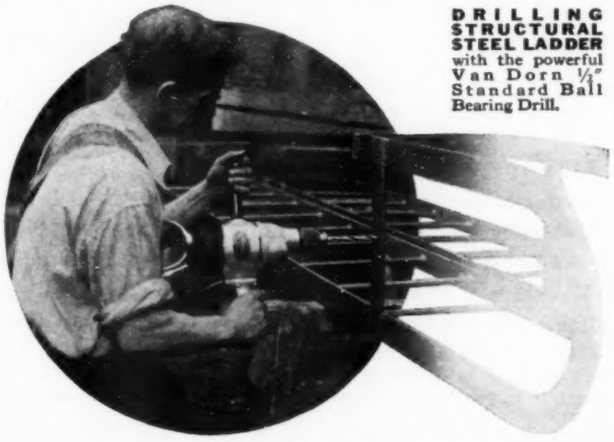
MADE IN ROCKFORD, ILLINOIS, U. S. A.

From Light Assembly to Heavy Reaming

There's a Drill for Every Purpose in the Van Dorn line



DRILLING OIL BURNER CASTINGS for installing name plates with the Van Dorn 3/16" Drill—the tool with a thousand and one uses in assembly work.



DRILLING STRUCTURAL STEEL LADDER with the powerful Van Dorn 1/2" Standard Ball Bearing Drill.

That's right. You're sure to find just the drill you want in the Van Dorn line. For Van Dorn offers you a choice of 20 models for every purpose—from the light, speedy 3/16" Drills for assembly use to the big, powerful 1" Heavy Duty Ball Bearing Drill which takes two husky men to handle. And prices start as low as $19.50. Ask your Van Dorn jobber for demonstrations—or write for complete catalog. The VAN DORN ELECTRIC TOOL CO., 716 Joppa Road, Towson, Maryland.

(Div. of The Black & Decker Mfg. Co.)

HEAVY DRILLING AND REAMING in structural steel is quick work for the big, husky Van Dorn 1" Heavy Duty Ball-Bearing Drill.

FOR POWER SPECIFY

"Van Dorn"

PORTABLE ELECTRIC TOOLS

now we're

GUARANTEEING *'em*

extra production . . .

"If *that* isn't the best reason for buying our belting . . . !

"Here's the angle. We've had enough performance facts to prove that the new Research Belting will increase average machine production at least 1 or 2% over ordinary belting. It's done it in metal-working plants, in textile mills, in flour mills, paper mills — *everywhere!*

"So you can definitely say to the plants you call on — that Research Leather Belting will increase average machine production at least 1 or 2% over ordinary belting . . . or they can have their money back."

AND you can have *your* money back if Research Belting, on the drives in *your* plant, does not increase average machine production at least 1 or 2% over ordinary belting. Increases of 3 and 4% are not uncommon — and savings of thousands of dollars and many hours a year. It's the completely new manufacturing processes developed in our Home of Research that does it — increases coefficient of friction — eliminates wasteful stretch — insures extra machine production.

The purchasing manager in your plant can find the nearest Research Belting sales office or distributor in the Graton & Knight insert in the belting section of 1937 THOMAS' REGISTER. Give him a ring on the phone now . . . have Research Belting put on an important drive where the increased production can be measured.

MODERN GROUP DRIVE

Graton and Knight

RESEARCH BELTING

from the Home of Research, Worcester, Mass.

WRITE FOR OUR HOME OF RESEARCH BOOK ON ECONOMICAL POWER TRANSMISSION

6806

Now ready!

150 PAGES *of* USEFUL FACTS *for* FINE STEEL USERS

Write Today

FOR YOUR

FREE COPY

Compiled by men who make fine steels to assist men who use fine steels, this handy, pocket size volume contains many new, helpful charts, also conversion, weight and reference tables all made quickly available by a unique method of indexing.

Correct tool steel specification is today more complex than ever. With scores of different steels for scores of different purposes the problem is still further complicated by different methods of heat treatment.

That's why the new Tool Steel Finder, compiled by Ludlum, should be in every busy shop where fine tool steels are used. Almost at a glance this comprehensive chart shows how to select the right steel for the job; and, what is equally important, how to get the utmost out of it.

The Tool Steel Finder is but one of many helpful features contained in the new book, "FINE STEELS by LUDLUM." There is also a Stainless Finder giving similar information on corrosion and heat resisting steels, with a table showing the comparative resistance of each grade to the various corrosive agents. Other valuable data, gathered by means of physical tests and practical experience, cover Nitralloy and special products such as Hollow Drill Steel, Magnet Steel, Welding Rods for Hard Surfacing, etc.

If you buy or specify fine steels this new book will be of practical help. We shall be glad to mail your copy free. Just use the coupon or write on your business letterhead. Address Ludlum Steel Co. Dept. AM2 Watervliet, N. Y.

MAIL THIS COUPON

LUDLUM STEEL COMPANY, Dept. AM2
Watervliet, N. Y.

I should like to have a free copy of "FINE STEELS," including the NEW TOOL STEEL FINDER and other useful facts. This request does not obligate me in any way.

*Name*_____

*Address*_____

*City*_____ *State*_____

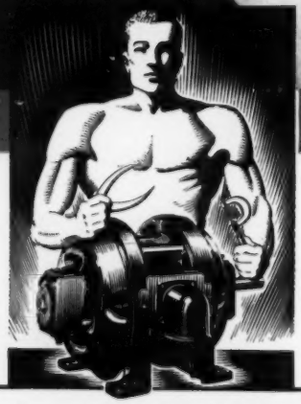
*Company*_____

LUDLUM

FINE STEELS SINCE 1854

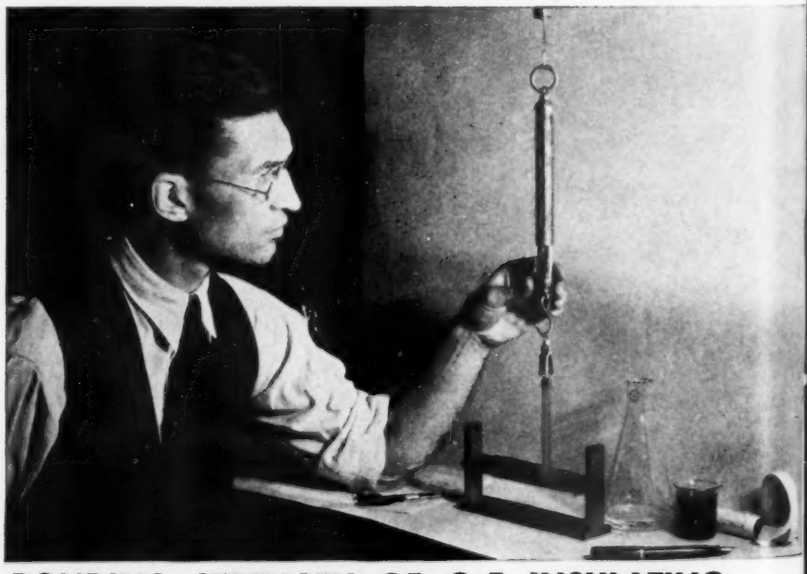
TOOL · STAINLESS · CARBON · ALLOY

BONDED FOR



G-E MOTORS PASS ALL TESTS

G-E motor-insulating varnish bonds the stator coils of G-E random-wound induction motors so solidly together that it requires a strong pull to tear apart the individual conductors. When actually measured in the laboratory, as shown at the right, the bonding strength of G-E varnish was shown to be 10 to 17 times greater than that of ordinary varnishes. From raw materials to the finished product, G-E motors are tested at every step along the production line, not only to make sure that G-E quality is maintained, but also to find new ways to raise it still higher.



BONDING STRENGTH OF G-E INSULATING VARNISH PROVED BY LABORATORY TEST

GENERAL ELECTRIC

LONGER LIFE

IT takes a husky pull to separate an individual conductor from the solidly bonded stator coils of a G-E random-wound motor. These coils are bonded for *longer life* with the new G-E motor-insulating varnish. This varnish has 10 to 17 times greater bonding strength than ordinary insulating varnishes, and protects the windings against moisture, mild acids and alkalis, abrasives, and mechanical injury.

Why Bonding Means Longer Life

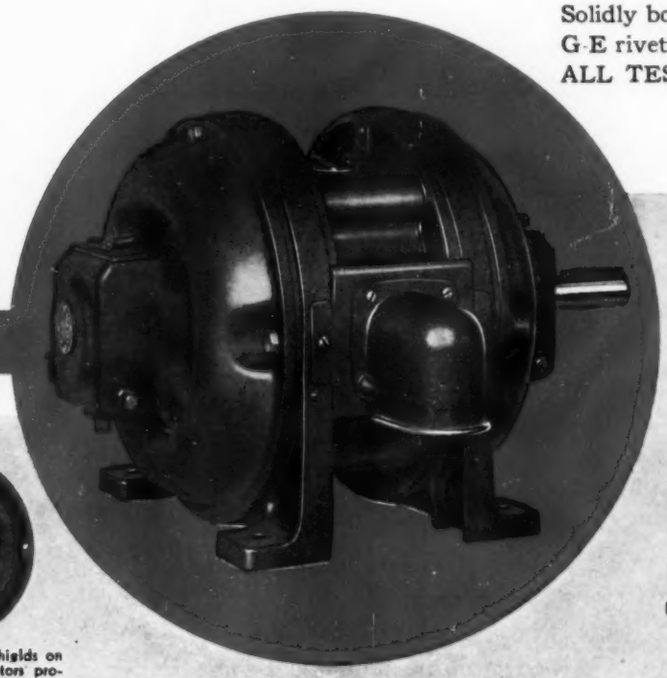
This new varnish gives longer life to G-E random-wound motors because the solid bonding of each coil prevents abrasion and the pulling apart of the individual turns. Thus, the enamel film on the wire—the most important part of the entire insulation system—is protected against chemical and mechanical injury.

Proved by Test

As a simple test of the bonding strength of the new G-E motor-insulating varnish, G-E engineers wound small tubes with several layers of cotton tape. They impregnated some tubes with the new G-E varnish, and others with ordinary motor insulating varnish, and baked them.

As shown in the lower left illustration, they then measured the force required to unwind the tape from the tubes. At the first layer, the tape impregnated with G-E varnish showed 10 times greater bonding strength, and the third layer 17 times greater bonding strength, than the tape impregnated with ordinary varnish. This test conclusively proved the superior bonding and penetrating qualities of G-E varnish. It also proved that the coils of G-E random-wound induction motors are solidly bonded together for longer life.

Solidly bonded windings are only one feature of the new G-E riveted-frame induction motors—motors that PASS ALL TESTS. Send the coupon for complete information.

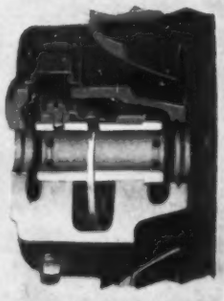


NEW G-E INDUCTION MOTOR

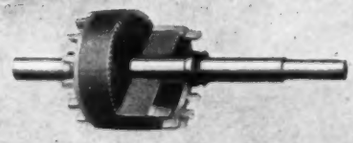
Check these Extra Values

Strong, cast-iron end shields on all G-E induction motors protect the end windings and provide rigid support for the bearings

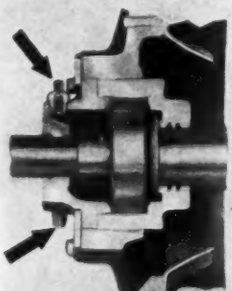
Malleable-iron end frames with integrally cast feet give G-E induction motors of 1 to 15 hp extra strength and rigidity



Steel-shell, babbitt-lined sleeve bearings, sealed against dust and dirt, assure long life of bearings and low maintenance costs



Indestructible cast-aluminum rotors, with integrally cast fans, have no joints to cause high-resistance spots



G-E pressure-relief lubricating system of cartridge-type ball bearings permits lubrication of motor without disassembly

Convenient knockoff ledges save time in disassembling motor. No special tools required. No danger of damaging the motor

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Send for your copy of this new, useful bulletin

General Electric

Dept. 6 B—201, Schenectady, N. Y.

Please send me a copy of your new bulletin containing complete and detailed information on G-E squirrel-cage induction motors (GEA-2345).

Name.....

Company.....

Address.....

020-288

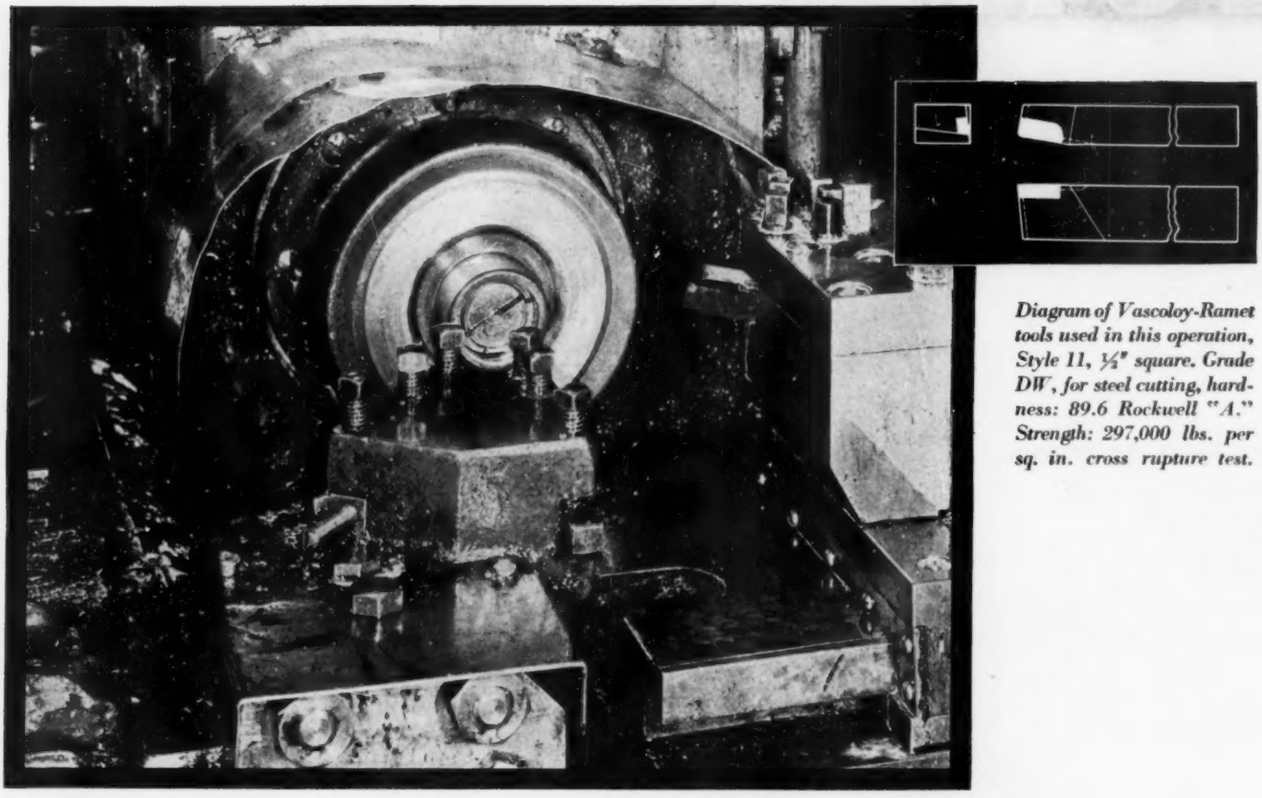

Diagram of Vascoloy-Ramet tools used in this operation, Style 11, ½" square. Grade DW, for steel cutting, hardness: 89.6 Rockwell "A." Strength: 297,000 lbs. per sq. in. cross rupture test.

Machining Automobile fan drive pulley. Material: spun steel. Operations: facing flange 4⅝" to 2¾" diameter at section faced, turning O.D. of hub 2" diameter. Performance of Vascoloy-Ramet Tools, Grade DW

Vascoloy-Ramet	Speed	Feed	Depth of Cut	Pieces per Grind
Grade DW	587 R.P.M.	.0098"	.007" to .013"	1,000

With Vascoloy-Ramet, the tantalum carbide tool material, "A grade for every use," is no mere catch-phrase.

Produced in 17 standard grades, of different tantalum content, strength and hardness, it alone covers the entire range of machinable materials and meets every machining requirement.

This is one reason for its rapid and widespread acceptance as the preferred tool material. One reason why, in plants throughout the country, new records are being made for pieces per grind, for greater speed from floor to floor, and for lowered machining costs.

Unrivaled in the machining of steel, Vascoloy-Ramet, alone is proof against "cratering." On cast iron, semi-steel, non-ferrous metals and materials, its performance is exceptional.

The new Vascoloy-Ramet catalog and price list will be gladly sent upon request.

VANADIUM-ALLOYS STEEL CO.
VASCOLOY-RAMET DIVISION, NORTH CHICAGO, ILL.

VASCOLOY-RAMET

. . . The TANTALUM CARBIDE TOOL MATERIAL . . .

A GRADE FOR EVERY USE

District Sales Offices:

Pittsburgh	Pa.
New York	N. Y.
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BAY STATE

Leading automobile manufacturers are using BAY STATE abrasive products for the perfection of piston-cylinder action, for grinding of crankshafts, and for the many other precision operations in the production of their 1937 models. BAY STATE SIGNIFIES QUALITY.

Let us supply your abrasive requirements for the coming year.

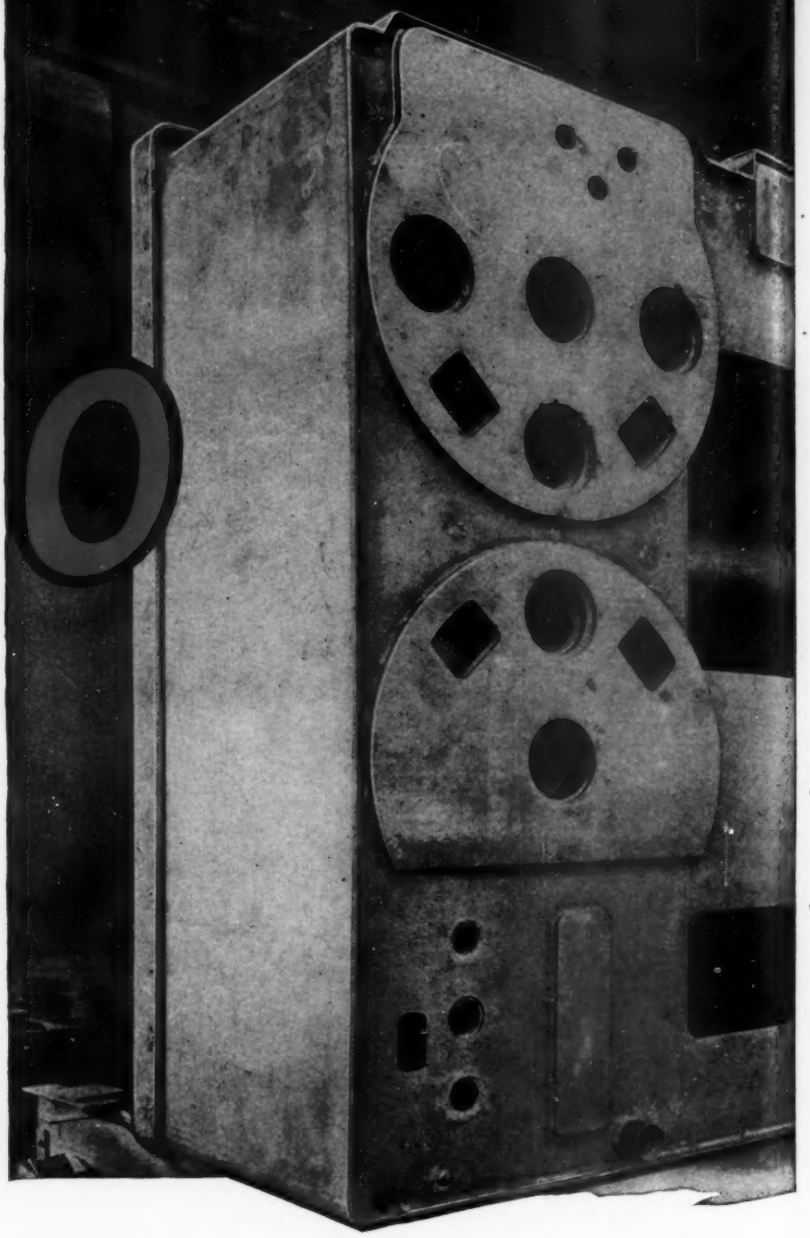
BAY STATE

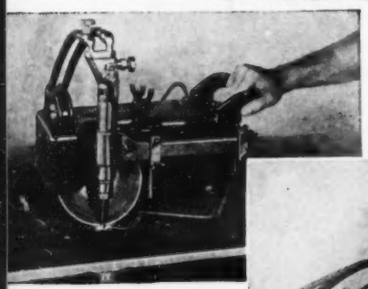
Abrasive Products Co.

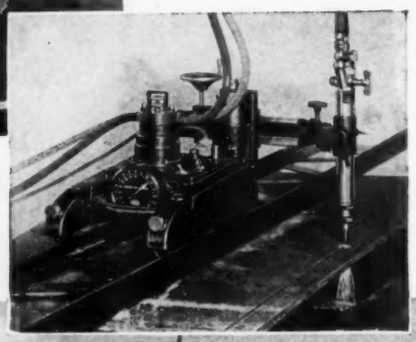
Westboro, Massachusetts

Flame cut by AIRCO -DB

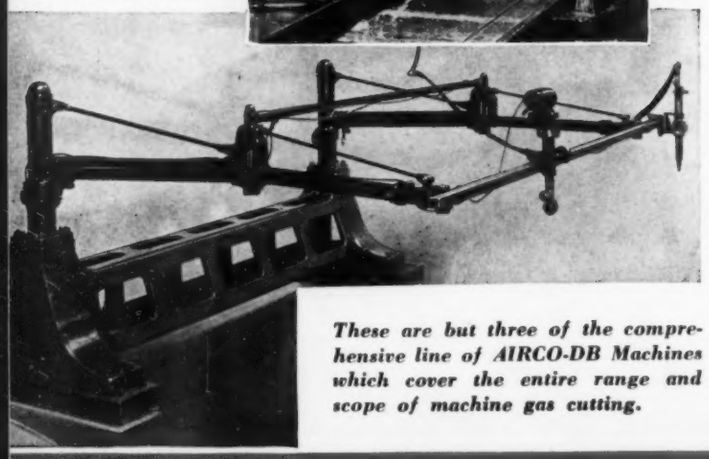
Gas Cutting Machines







TRACTOGRAPH
RADIAGRAPH ➤
OXYGRAPH



These are but three of the comprehensive line of AIRCO-DB Machines which cover the entire range and scope of machine gas cutting.

All of the parts which form this base, and the openings in them, were accurately cut to size and shape with the three AIRCO-DB gas cutting machines shown at the left. And, of course, economical high purity AIRCO oxygen and acetylene were used.

A factor in the successful completion of this fine piece of modern welded fabrication, was the practical cooperation of AIRCO'S Applied Engineering Department — cooperation that is freely given to all users of AIRCO Products which cover every welding and cutting need.

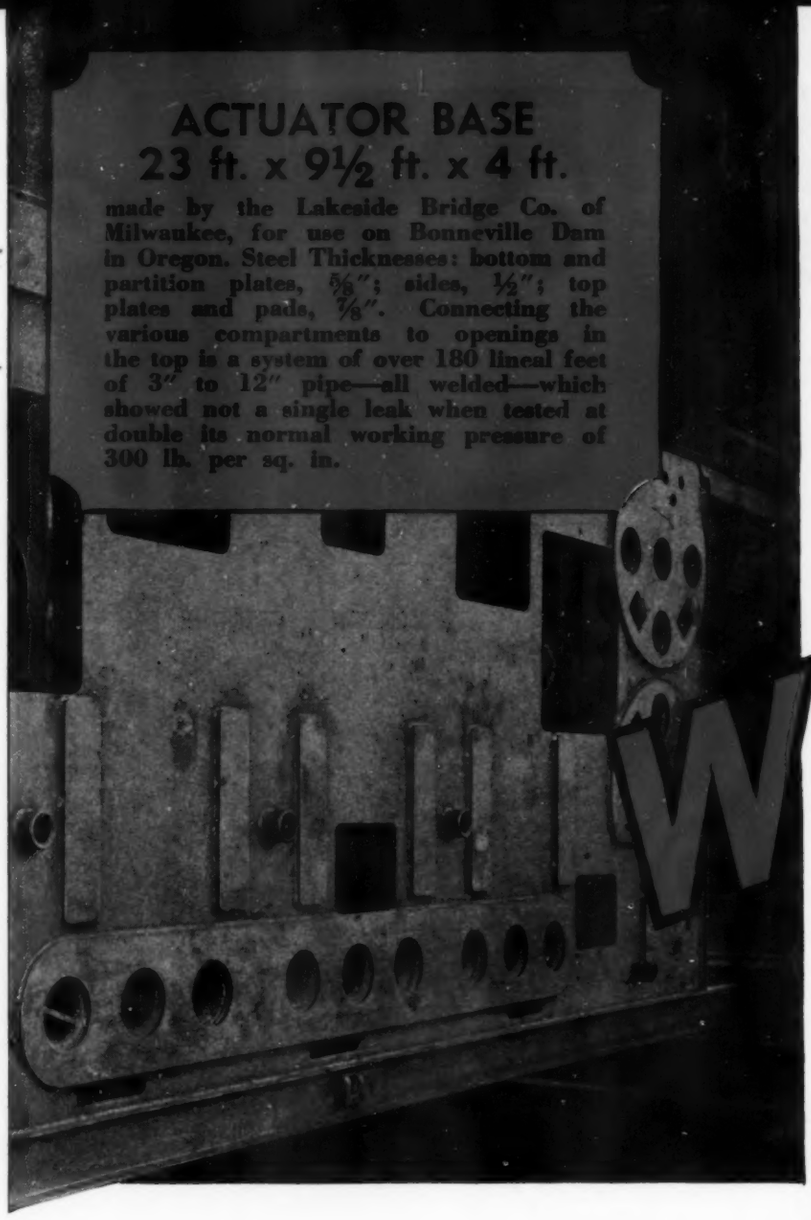
Complete details about AIRCO-DB GAS Cutting Machines will be furnished on request.

AIR REDUCTION SALES COMPANY

General Office: 60 East 42nd St., New York City

DISTRICT OFFICES and DISTRIBUTING STATIONS in PRINCIPAL CITIES

AIRCO THE NATI
for Anything and Every


ACTUATOR BASE
23 ft. x 9½ ft. x 4 ft.
made by the Lakeside Bridge Co. of Milwaukee, for use on Bonneville Dam in Oregon. Steel Thicknesses: bottom and partition plates, ⅝"; sides, ½"; top plates and pads, ⅞". Connecting the various compartments to openings in the top is a system of over 180 lineal feet of 3" to 12" pipe—all welded—which showed not a single leak when tested at double its normal working pressure of 300 lb. per sq. in.

Welded by WILSON

Electric Arc Welders

All of the welding of parts and piping on this job was done with WILSON WELDERS.

The Lakeside Bridge Co., like so many other concerns doing electric arc welding, has standardized on WILSON WELDERS—"*the machines that make the arc behave.*" It is this inherent ability of WILSON WELDERS to establish and maintain a stable, uniform-heat generating arc, that makes arc welding easier to perform and brings down its cost.

Write for the WILSON WELDER Bulletin which contains full details including types and capacities.

WILSON WELDER & METALS COMPANY, INC.

General Office: 60 East 42nd St., New York City

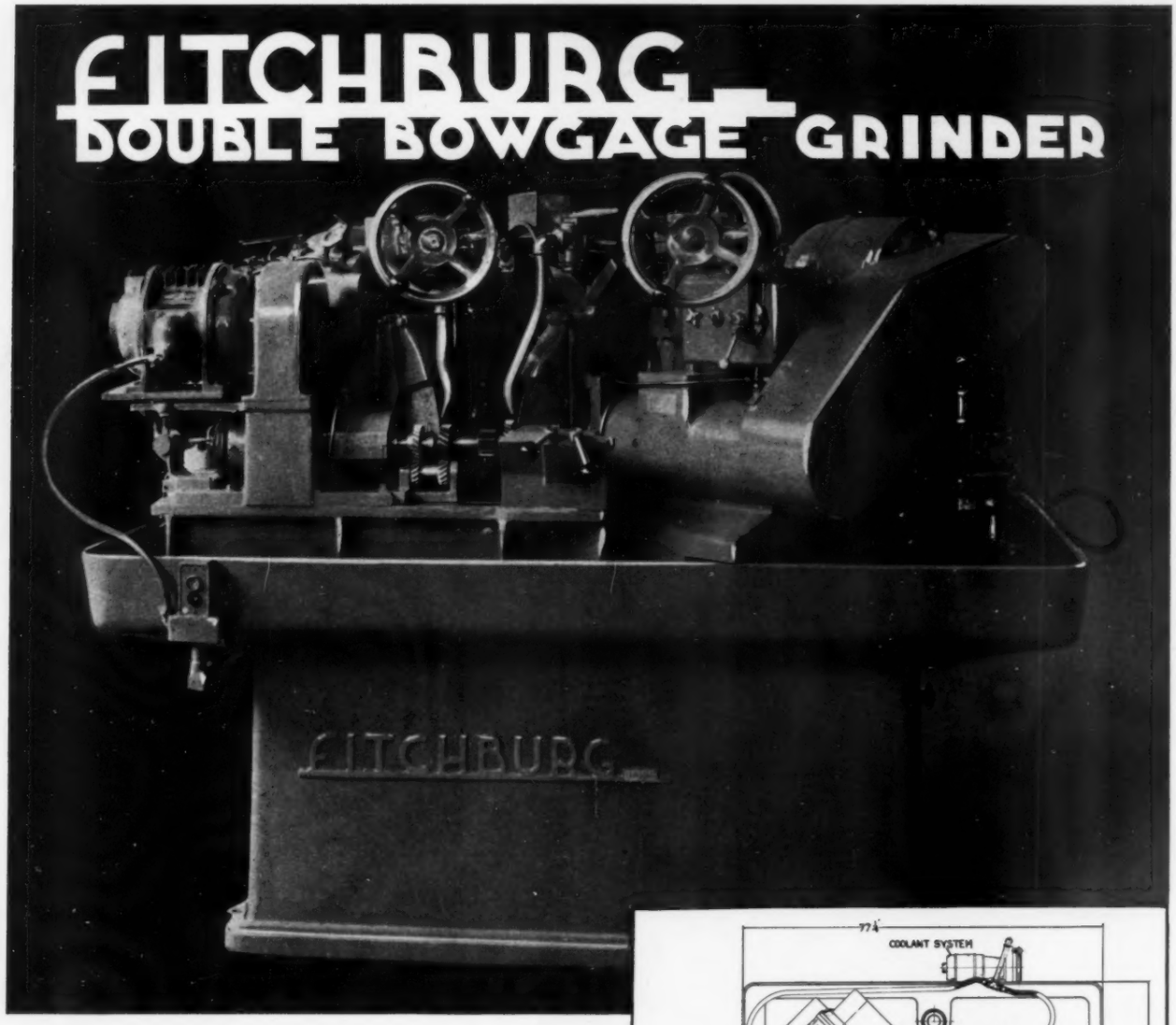
Distributed through AIR REDUCTION SALES COMPANY

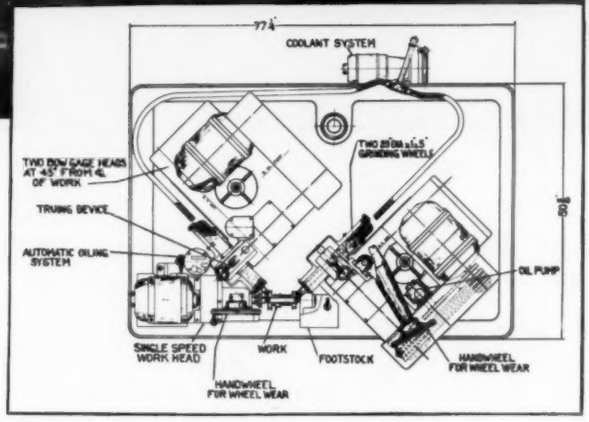
Welding on the actuator base in progress showing two of the battery of WILSON ARC WELDERS which serve this shop.

ON-WIDE SUPPLY SERVICE

***thing needed in* FLAME CUTTING *and* WELDING *by* GAS *or* ELECTRIC ARC**

FITCHBURG
DOUBLE BOWGAGE GRINDER





A double wheel head machine equipped with two BOWGAGE completely independent hydraulic heads. In this case, the heads are set at 45° and each head has a rapid advance, slow feed, grinding dwell, and rapid return.

Special machines may be built up from stock units as the heads may be placed in any position on the base with stock machine deliveries.

The BOWGAGE wheel head is a patented feed controlled by a laminated bow toggle. A constant hydraulic vertical motion flexes the toggle to its flat position resulting in a gradually decreasing wheel feed without back-lash and with a positive definite movement controlled by graduated dial. Dwell and feed rate are also dial controlled in a panel on each head. This makes a complete self-contained flexible grinding unit.

We can also grind your spline shafts under contract with our new Type "B" Spline Grinder.

FITCHBURG GRINDING MACHINE CORP.
FITCHBURG, MASSACHUSETTS. U.S.A.

MILLED FROM THE BAR—Chrome-Molybdenum steel—the microscopic fibres of the metal are undistorted and unweakened. This gives the right *start* to the Allen product, preparatory to cold-drawing the sockets. . . Then Allen cold-drawing *shapes* the sockets by drawing the metal along the lines of its natural flow.

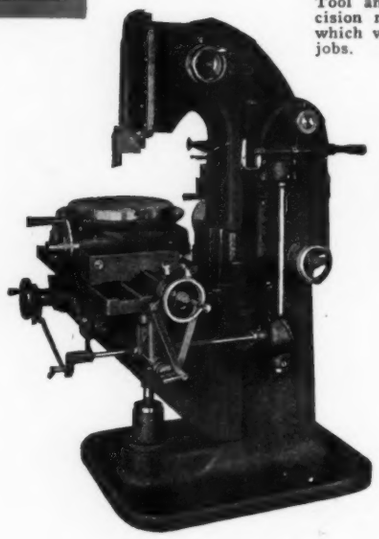
Not only does the Allen process preserve the cohesion of the fibre bundle. It increases the natural strength of the steel by increasing its density through *compression.* It packs the fibres more closely together. . . This is the metallurgical answer to the question,—Why are Allens stronger? And why are they IN stronger with industrial users?

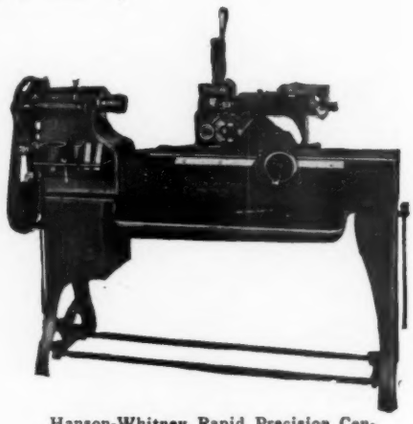
THE ALLEN MFG. COMPANY *HARTFORD, CONN. U. S. A.*

Sole European Distributors: **S. RALPH GOLDING & CO.,** ★ **15 MALLOW STREET, OLD STREET,** ★ **LONDON, E. C. 1.**

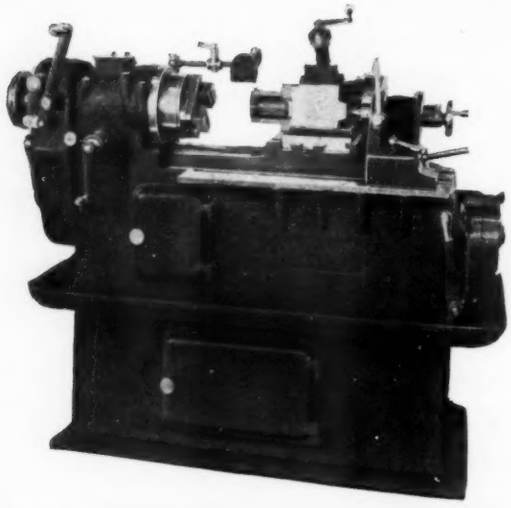
Leading the way to increased production in 1937

Hanson-Whitney Universal Vertical Tool and Die Shaper—a fast precision machine for dies and tools which will effect savings on many jobs.





Hanson-Whitney Rapid Precision Centering Machine—a time and labor saver which rotates the work and supports it in a 3-point center rest.



Hanson-Whitney Universal Semi-Automatic Thread Milling Machine—assuring fast, precision work on either external or internal thread milling, right or left hand threads.

The Hanson-Whitney Machine Company

Hartford, Conn., U.S.A.

The modernization programs that will pay the highest returns in 1937 will be those which bring laboratory standards of precision to both tool room and production line.

Hanson-Whitney machines and tools lead the way in achieving lower costs, greater accuracy and interchangeable manufacturing.

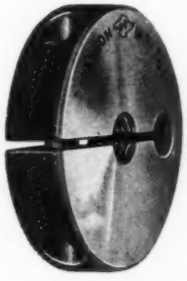
The H-W Universal Semi-Automatic Thread Milling Machine assures the speedy handling of external threaded parts, as well as close precision milling of internal threads. For the wide range to make a special machine profitable the Hanson-Whitney Hob Thread Milling Machine cannot be beaten. A "finished-after-hardening" Hob mills a thread practically perfect in lead and pitch in one revolution of the work. This machine is semi-automatic in operation, the operator merely removing and inserting the parts after each cycle.

Then, too, Hanson-Whitney offers also Universal Vertical Tool and Die Shaping Machines, Rapid Precision Centering Machines, etc., which because of their time and labor savings are profit-earners in any plant.

Send for descriptive Bulletins.

"Hanson Process finished-after-hardening" Taps, Hobs, Gauges and similar precision tools are leaders in accuracy, long life and economy. Their use has immeasurably increased production, reduced tool expense, wiped out assembling delays and reduced spoilage.

Many unique and patented designs are available to meet practically every need. Write for catalog covering the complete standard line of "Hanson-Process" tools and gauges.

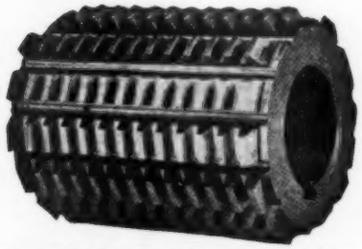


Thread Gages in the Hanson-Whitney line are "Finished after Hardening" by the Hanson Process.

Taper Pipe Taps of high speed steel, "Finished after Hardening" are available in sizes from ⅛ in. to 2 in.

One of the long line of "Hanson Process" Taps.

"Hanson Process" Thread Hob.



Hanson-Whitney Hobs are "Finished after Hardening" by the Hanson Process.

Every dimension of "Hanson Process" Taps is under complete control.

DOMESTIC REPRESENTATIVES

MACHINERY AND SMALL TOOLS—Cincinnati, Ohio, Seifreat-Elstad Mchy. Co.; Dayton, Ohio, Seifreat-Elstad Mchy. Co.; Detroit, Mich., A. G. Brice—H. B. Morrison; New York, N. Y., L. C. Biglow & Company, Inc.; Pittsburgh, Pa., William K. Stamets; San Francisco, Calif., A. H. Coates & Company; Syracuse, N. Y., George McPherson; Toronto and Montreal, Canada, Arthur Jackson Mche. Tool Co.

MACHINERY ONLY—Chicago, Ill., Marshall & Huschart Mchy. Co.; Cleveland, Ohio, William K. Stamets; Philadelphia, Pa., Lloyd & Arms, Inc.

SMALL TOOLS ONLY—Chicago, Ill., M. Ray Pearce; Cleveland, Ohio, George A. Whalon; Milwaukee, Wisc., George M. Wolff, Inc.; Philadelphia, Pa., General Tool Sales Co.

Dominating the 1937

1. GREATER PRODUCTION
"Maxi" Drills

Minnesota Manufacturer averages 150 holes per grind with one inch "Maxi" Drill against 20 to 25 average for other high speed drills. *Has now standardized on "Maxi" Drills.*

2. GREATER PRODUCTION
"Maxi" Taps

New England Manufacturer using Machine Screw Taps in cast iron gets 500 holes per grind with "Maxi" Taps against 125-250 with taps previously used. *Has now standardized on "Maxi" Taps.*

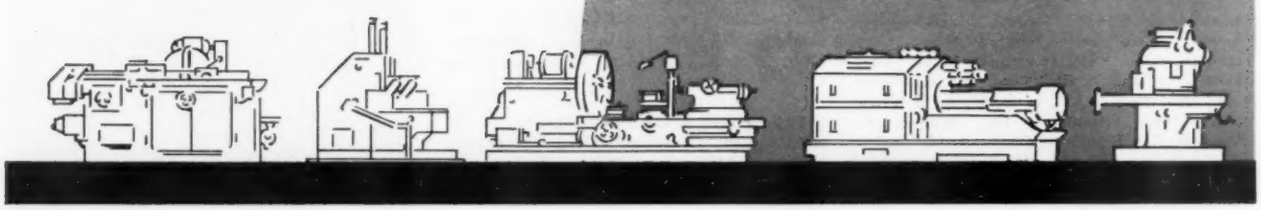
Maxi they're Black *Tools*

GREEN

GREENFIELD TAP & DIE CORP.

GREENFIELD, MASS.

In Canada: Greenfield Tap & Die Corporation of Canada, Limited, Galt, Ontario.



Production Scene

3. GREATER PRODUCTION
"Maxi" Reamers

Michigan Manufacturer using ⅝" Taper Shank Reamers in 1040 S.A.E. steel forgings gets over 2500 holes per grind with "Maxi" against 875 hole average with other high speed steel reamers. *Has now standardized on "Maxi" Reamers.*

4. GREATER PRODUCTION
Acorn Dies

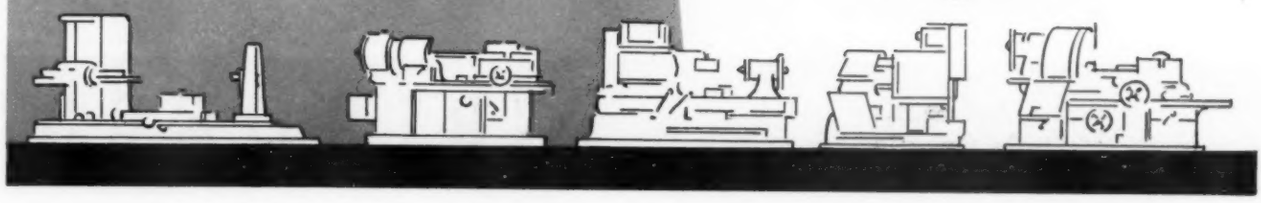
Mid-west Manufacturer threading ⅜-32 threads to shoulder on brass parts reports production of 150,000 perfect threads to gage without sharpening or adjustment. *Has standardized on Acorn Dies.*

FIELD

Branch Factory
2102 W. Fort St. Detroit, Mich.

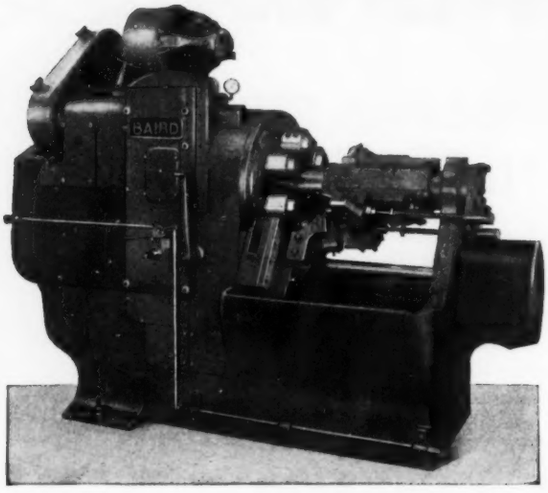
Warehouses in
New York and Chicago

Maxi they're Black *Tools*



Baird Automatic
Multiple Spindle

LATHES • CHUCKERS



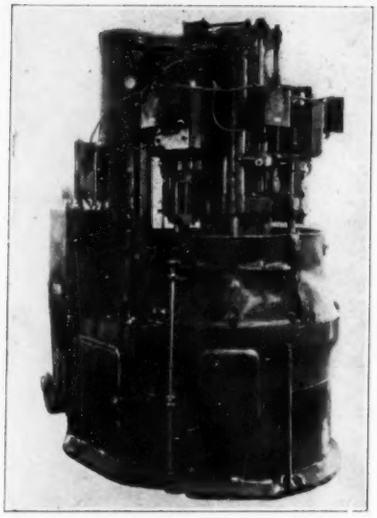
Designed for work up to 10½" diameter held on centers or in chucks, these machines are built to deliver a fine degree of accuracy.

Features like holding fixtures, safety controls, lubrication, and cooling of cutting tools are automatic while indexing is especially smooth and quick. Variable speeds for the spindles are provided and independent attachments can be purchased as needed.

So many combinations are available that we suggest you send samples or prints of your work for a detailed engineering study and report. There's no obligation for this service.

BAIRD MACHINE COMPANY

BRIDGEPORT, CONNECTICUT



Like Baird Automatic Lathes and Chucking Machines, Baird Grinders are built both horizontal and vertical. Mechanical features are the same as enumerated above plus automatic truing and sizing of grinding wheels.

Wheels may be adjusted or changed at any station without disturbing the others and different sized wheels may also be used. Additional flexibility of operation is afforded by the fact that different diameters may be ground with one pass through the machine and by means of swivel heads which are provided for angular grinding.

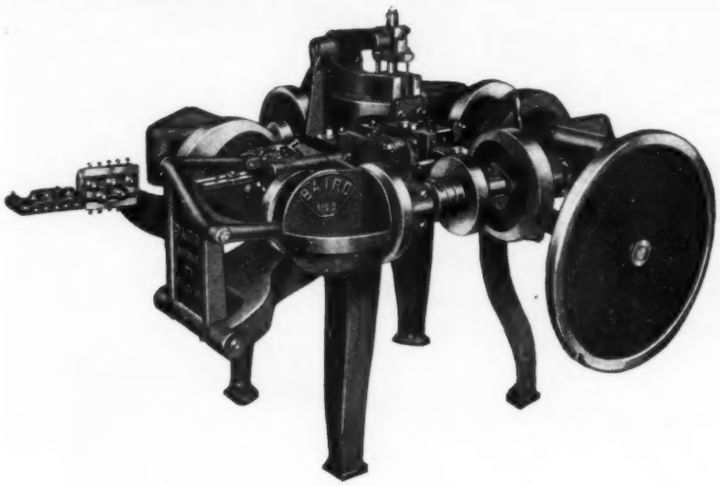
Let our engineers study your own particular problem and make specific recommendations.

Baird Automatic
Multiple Spindle

GRINDERS

Baird Automatic
Wire and Ribbon

METAL FORMERS



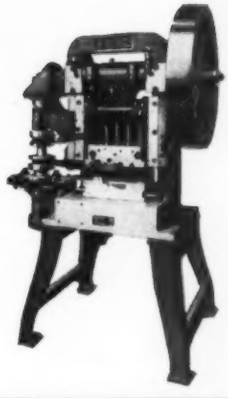
Without sacrificing efficiency, Baird has been able to design a machine which can accommodate almost every type of wire and ribbon metal forming job in demand today.

This machine, the Baird Four Slider, is built in quantity, and many sizes are regularly carried in stock. Outstanding among its features are rigid construction, speedy and smooth operation, accessibility of tools, general openness of design throughout.

For work not exactly suited to this standard machine, special equipment is being designed constantly, and we are therefore in position to fill every possible requirement along this particular line.

It will pay you to . . . . .
"ASK BAIRD ABOUT IT"
Makers of Automatic Machinery since 1846★

Shown is our latest model Oblique Tilting Tumbler which is marked by a high degree of safety, low consumption of power, and economy of floor space. This is but one of the many pieces of tumbling equipment, tilting and horizontal, which is manufactured by Baird.



Foot presses, bench power presses, as well as all types of automatics are included in the Baird line. Do not hesitate to call upon our engineers for advice.

★ Illustrated and briefly described here are only a few of the many machines developed by BAIRD since its founding. It is impossible to cover everything in so little space, so why not let us know what problem faces you and together we should be able to find the solution.

TUMBLERS

PRESSES

Are Out-of-Date Hand Methods keeping your Maintenance Costs Too High?

MODERNIZE for Economy, with these three Low Cost Black & Decker Electric Tools

OPENING 2" HOLES IN A TANK for installing pipe lines with the Black & Decker ½-Inch Junior Drill and a Black & Decker Hole Saw. The ½-Inch Junior in the handiest size drill for maintenance work handles countless drilling jobs in wood, metal, composition, etc. With Black & Decker Hole Saws, it cuts clean, round holes from ¾" to 3½" diameter in any material a hacksaw will cut. The ½-Inch Junior Drill sells for **only $35.00.**

PROPER tools are just as essential in maintenance work as on the production line. Economical maintenance, too, shows up on the profit sheet. Check over your maintenance operations for the past six months. See how many were costly hand operations which could have been handled quicker, better, at lower cost, with Black & Decker Portable Electric Tools. Then ask your jobber to demonstrate the three tools on this page, and other Black & Decker Tools for maintenance work, right on the job in your plant—so you can make actual time and performance comparisons. Or write for complete information. Black & Decker Mfg. Co., 716 Pennsylvania Ave., Towson, Maryland.

REMOVING OLD PAINT with thenew B. & D. 7-Inch Junior Sander, the ideal tool for quickly smoothing and finishing metal and wood surfaces for painting —removing rust and paint —smoothing welds and casting ridges—rubbing down lacquer with felt pad, etc. Saves countless hours of hand work with sandpaper, emery, files, etc. A great value for **only $39.50.**

DRILLING TO REMOVE BROKEN BOLT with the Black & Decker ¼-Inch Junior Drill—one of the thousands of drilling operations in wood, metal and composition on which this inexpensive tool cuts the cost of maintenance work and speeds emergency repairs. The ¼-Inch Junior is a husky, powerful drill—built for years of service on intermittent work. Yet it costs **only $19.50.**

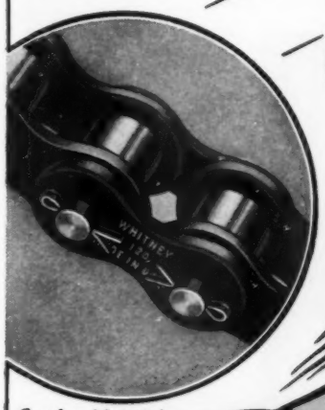
BLACK & DECKER

World's Largest Manufacturer of

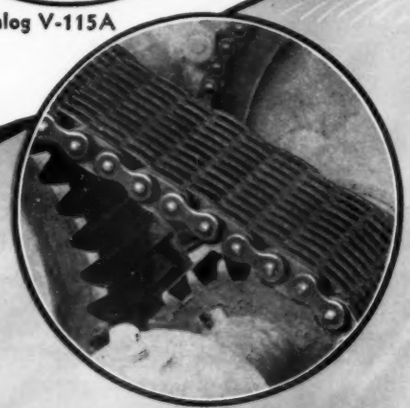
PORTABLE ELECTRIC TOOLS

Write PERFORMANCE into your drive Specifications

Chain Drives by Whitney

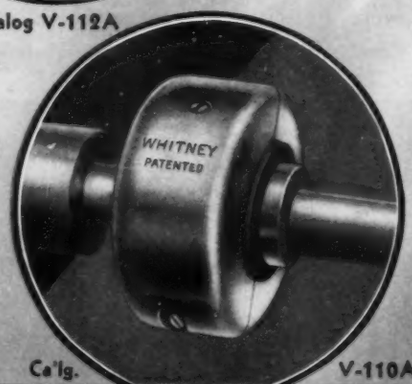


Catalog V-115A



Catalog V-112A

Write today for catalog on Whitney Roller Chain, Silent Chain or Flexible Couplings



Ca'lg. V-110A

The hand that writes your power drive specifications also writes, for better or for worse, the performance of your machinery and plant equipment. More is at stake than the choice of any particular drive, because losses in machine production and efficiency can be traced in many cases directly to the drive between the motor and the machine.

Why are Whitney Chain Drives the choice of so many leading machinery builders? Because they give maximum power to the machine with minimum frictional losses and because they do not depend upon excess belt tension and bearing loads to give efficient operation. In other words, they allow the full machine capacity to be realized.

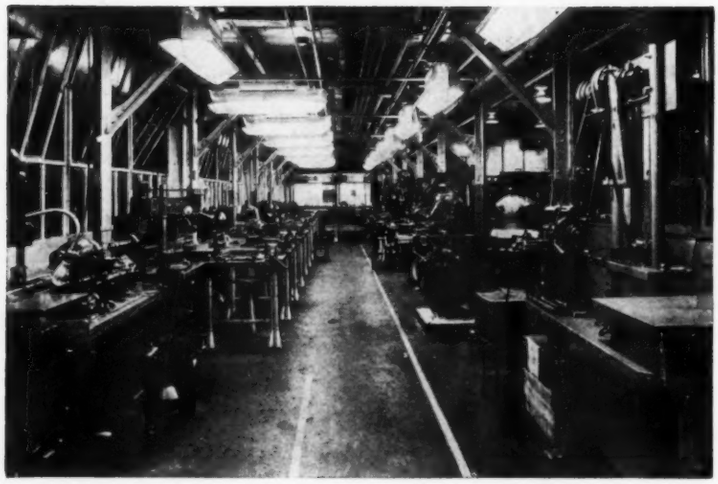
Another interesting fact about Whitney Chain Drives is their economy. Due to the generous use of heat treated alloy steels and precision manufacturing methods, Whitney Chains stand up under the most severe operating conditions, and pay their cost many times over in freedom from breakdown and production losses.

Write today for further information on the Whitney line which includes Roller Chain, Silent Chain, and Flexible Couplings. Our engineers are always ready to make recommendations. The Whitney Chain & Mfg. Co. Dept. B-6, Hartford, Connecticut.

WHITNEY CHAIN DRIVES

COOPER HEWITT ENGINEERED LIGHTING

Low intrinsic brightness eliminates eye-strain ... *banishes rejects*



Combination Cooper Hewitt and Incandescent Lamps provide this machine shop with detail-revealing, restful light that helps step up production.

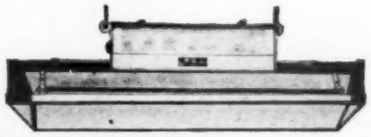
Give your workers cool, shadow-reducing Cooper Hewitt Mercury Light. Glareless, and unvarying in intensity throughout the 24 hours, this light aids more uniform production . . . banishes rejects. Its long light source helps operators to see down inside the hard-to-light spots on even the most complicated machines. Cooper Hewitt's yellow-green light alone is the ideal illumination where perception of detail is most important. Where color discrimination is desirable, incandescent lamps can be added to the mercury—achieving a close approximation to daylight.

General Electric Vapor Lamp Company engineers are lighting specialists with over 30 years' experience. They will gladly discuss "engineered lighting" for every job with you . . . General Electric Vapor Lamp Company, 831 Adams Street, Hoboken, New Jersey.

STANDARD COOPER HEWITT

"Better than daylight" for over thirty years

COMBINATION MERCURY AND INCANDESCENT

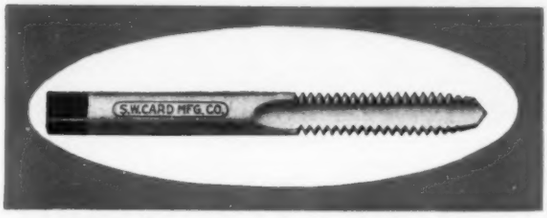


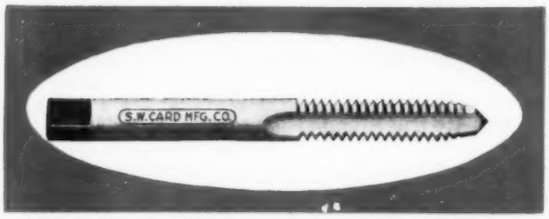
For use where color is of importance

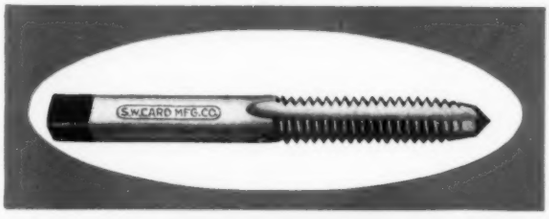
GENERAL ELECTRIC VAPOR LAMP COMPANY

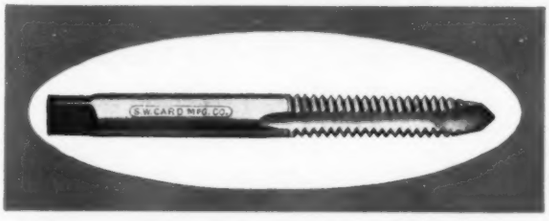
772C

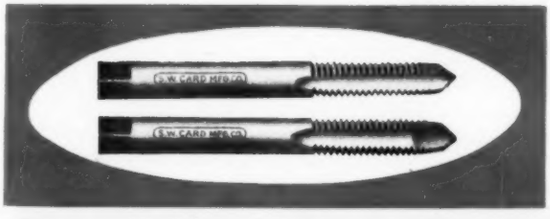
MACHINE SCREW TAPS
· Card Quality ·











Supplied in Carbon, High Speed Cut and High Speed Ground Thread.

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These taps have a wide reputation for uniformity and economical performance.

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They are easily worth more but they only command the market price for good quality.

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The delivery is immediate for regular items.

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Check this statement by putting them to work alongside of what you are using. The quicker you do this, the sooner you will start saving the difference. Sold by leading dealers everywhere. Send for circular on designs and recommended uses. Catalog 33 latest issue.

S. W. CARD MFG. CO.

Division of Union Twist Drill Co.

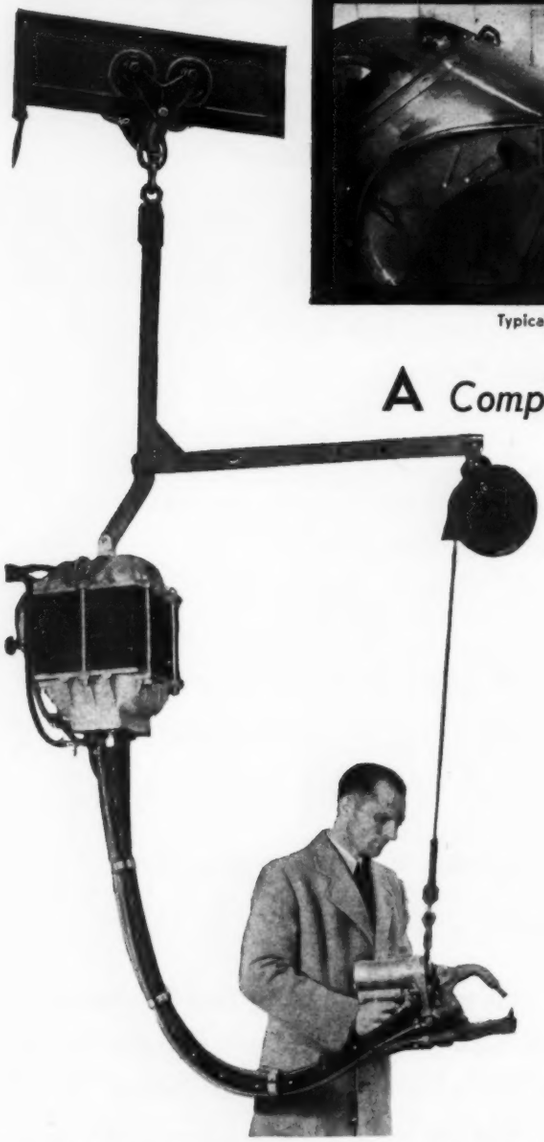
MANSFIELD **MASS., U. S. A.**

The CARD Quality

NEW YORK: 61 Reade St. DETROIT: 648 Antoine St. CHICAGO: 11 So. Clinton St. SAN FRANCISCO: 121 Second St.

MARTIN CONTROLLED AUTOMATIC SPOT WELDING GUNS

Typical set-up of automobile body on Martin Spot-Welding Fixture.



Products produced by Martin are found in every automobile plant where spot welding is used as a principal production process. The all-around reliability of this equipment in day after day of hard service is its own recommendation. The development of spot welding to today's efficiency has always been a special responsibility of Martin. Please write for bulletin on the use of Martin Equipment for either manual or automatic Spot Welding; and assembling and welding fixtures.

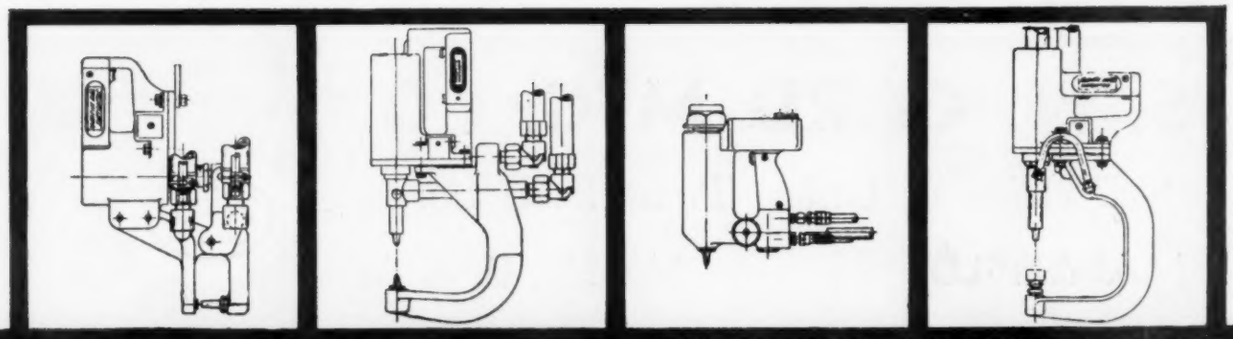
A *Complete* System and Equipment to meet every requirement of PRODUCTION and ASSEMBLY

The Martin Welding Gun has been especially designed to provide a practically unlimited range of combinations to handle the increasingly wide range of work now being spot-welded on a production basis. A still further development of these principles is found in the Martin Fixture Gun and Martin Fabricated Welding Fixtures providing the ideal equipment for high output fabrication of Welded automobile bodies and similar work. In each case proved Martin principles of simplicity, easy handling and fool-proof continuous production of perfect welds have set today's standard in this important type of operation.

Precision Welding With Machine-Gun Speed

Martin Guns with Martin Piston Control strike an entirely new note in welding equipment. Using the perfectly designed pistol grip and trigger control operations are so interlocked that it is impossible for the operator to make anything but perfect welds one after another. Martin Guns are light in weight and easily handled on the fastest production work. Our own specially designed and built control mechanism is exceptionally rugged. There are no packed joints or gaskets.

Cooling is so effective that day long use will hardly warm up the guns. Any of the many types can be equipped for fully automatic or "stitch" welding if desired. Send for our detailed bulletin and catalog. Use spot welding for quality output at low cost, and Martin Equipment for today's highest achievement in production spot welding.



MARTIN ELECTRIC CO. • 705 PIQUETTE, DETROIT, MICH.

For efficiency and economy . . . standardize on

DESMOND-STEPHAN
DRESSERS *and* CUTTERS

Fill all your wheel truing requirements from the Desmond line. It is not only complete, assuring you of just the right tool for every job, but is known for its high quality at no greater cost than equipment of less durable construction.

A request on your letter head will bring you our new catalog on Dressers and Cutters and name of your nearest distributor. Advice on your wheel dressing problems gladly furnished without obligation on your part.

DIAMO-CARBO GRINDING WHEEL DRESSER

This is the best all-around tool room dresser made. It will hand form special shapes to delicate edges without breaking the edge. In some cases it will take the place of diamond dressers.

NOS. 0, 1, 2, DESMOND HUNTINGTON DRESSERS

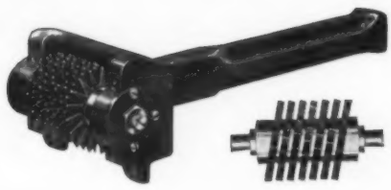
These dressers will give you quick action on your wheels. They are furnished with safety hoods and hardened bearings to insure long wear. Cutters are made from high quality steel and carefully hardened.

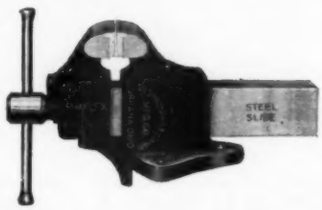
DESMOND-HEX DRESSER

The most durable mechanical dresser made. The hardened hex bearing nuts provide six sets of bearings in the dresser head. There is no wear on the dresser and the nuts are easily replaceable.

DESMOND HEAVY DUTY DRESSER

This dresser is especially designed for use on large and coarse wheels particularly Rubber and Bakelite bonds. The extra shearing angle of the cutters insures rapid action and the dust proof ball bearings give long service.





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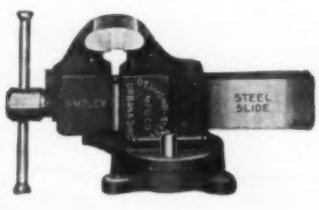
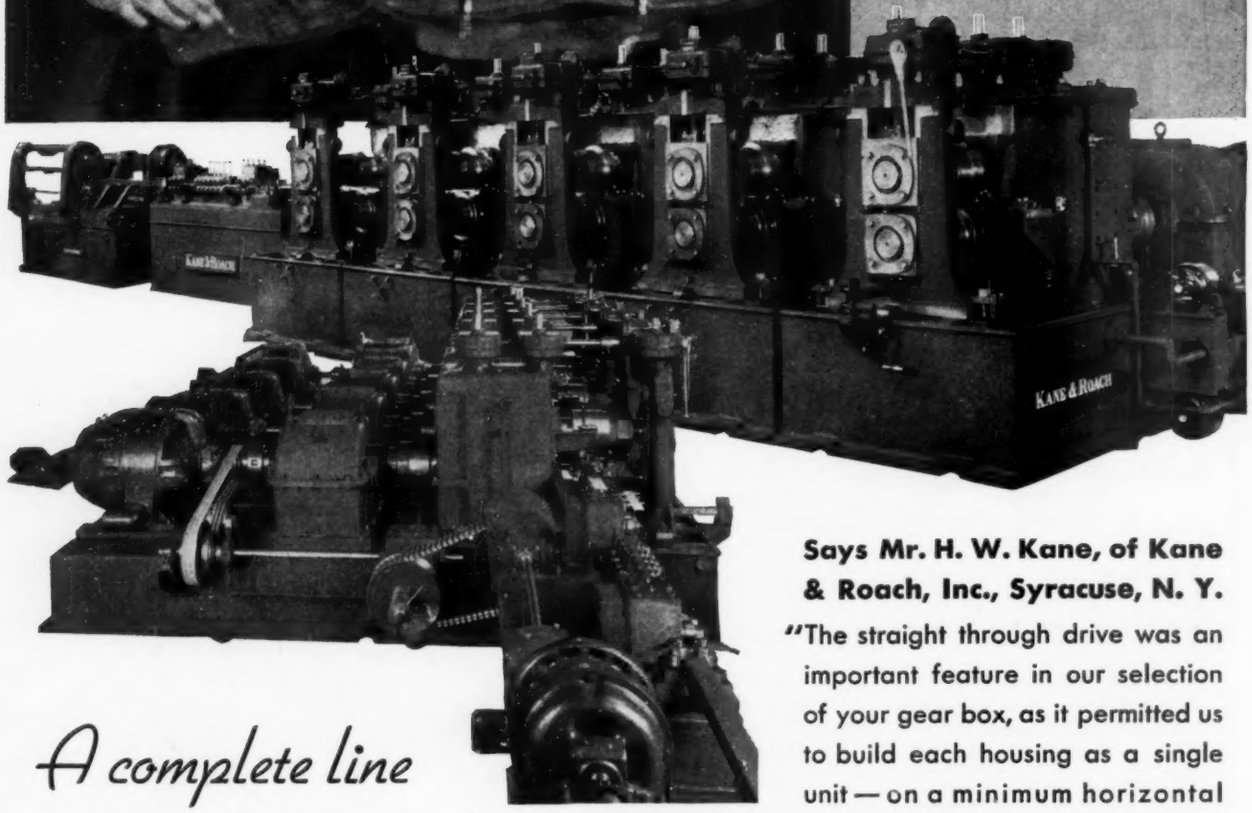
The exclusive solid steel slide makes these vises stronger and more serviceable than iron slide vises and they cost you no more. Let us send you a vise catalog and name of your nearest distributor.



DESMOND-STEPHAN MANUFACTURING COMPANY
URBANA, OHIO
Canadian Desmond Manufacturing Company, Ltd., Hamilton, Ontario

"AFTER A CAREFUL SURVEY WE SELECTED D. O. JAMES CONTINUOUS-TOOTH HERRINGBONE GEAR SPEED REDUCERS"



Says Mr. H. W. Kane, of Kane & Roach, Inc., Syracuse, N. Y.

"The straight through drive was an important feature in our selection of your gear box, as it permitted us to build each housing as a single unit — on a minimum horizontal center—a feature desirable should the customer at any future date wish to use one or more of these units for any other purpose."

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D. O. James Speed Reducers have been the choice of experienced engineers for almost a half century.

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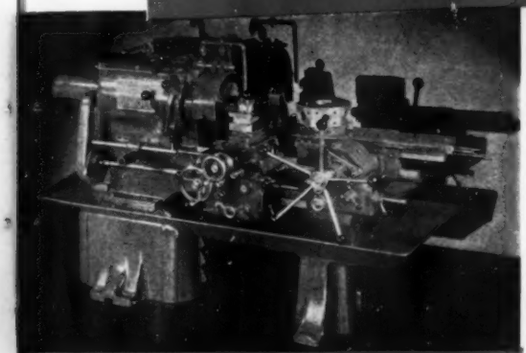
FOR ALMOST FIFTY YEARS MAKERS OF EVERY TYPE OF SPEED REDUCER AND CUT GEAR

LET'S GO!

WITH NEW SHOP EQUIPMENT

new GISHOLT MACHINE TOOLS

do better work — in less time — at lower cost



Gisholt Universal Ram Type Turret Lathes
No. 3—1⅛"x10" Bar Cap., 8" or 10" Chuck, 18⅛" Swing
No. 4—2" x12" Bar Cap., 8" or 10" Chuck, 18⅛" Swing
No. 5—2⅜"x16" Bar Cap., 10" or 12" Chuck, 19⅝" Swing

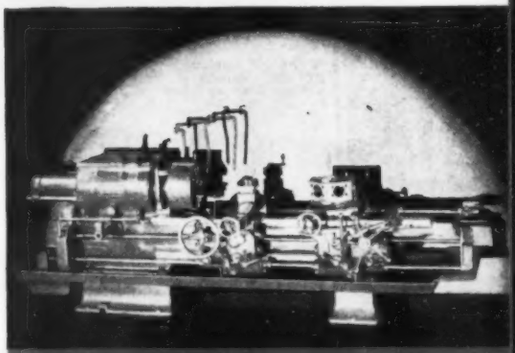
● American industry starts on another great forward march. Those prepared for it—those who employ the most modern methods and equipment—will be in the forefront.

We urge you now to review your own manufacturing problems—to take advantage of the improvements in these new Gisholt machine tools which permit you to make a better product at a lower cost.

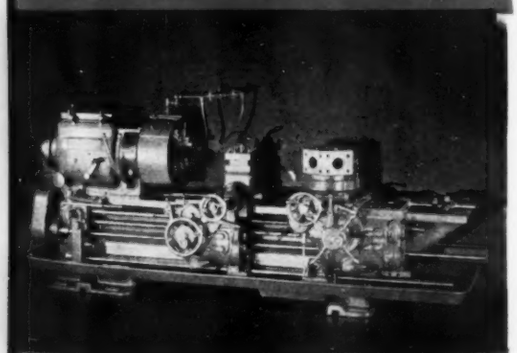
Each of these modern high speed Gisholts—regardless of size or type—assures you of quicker setup, easier operation, faster cutting, greater accuracy, increased production. Many installations pay for themselves out of cost savings within a few months.

Your investigation may mean thousands of dollars earned in extra profits during the next few years. An outline of your turning problems will bring complete information on the Gisholt best suited to your work.

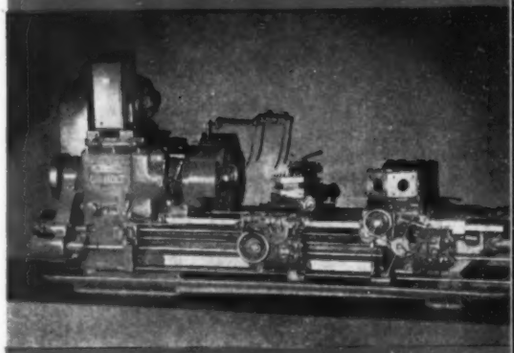
GISHOLT MACHINE COMPANY
1201 EAST WASHINGTON AVENUE
MADISON, WISCONSIN, U. S. A.



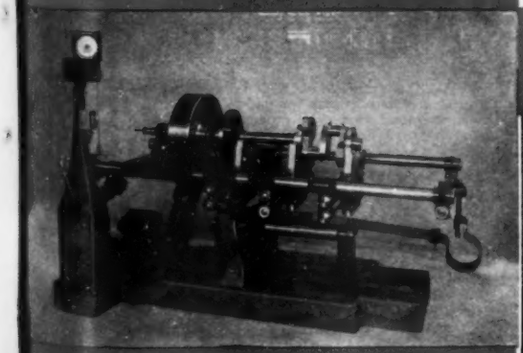
Gisholt High Production Turret Lathes
1L—2¼"x36" Bar Capacity, 12" Chuck, 17" Swing
2L—3⅛"x48" Bar Capacity, 15" Chuck, 19" Swing



Gisholt Heavy-Duty Turret Lathes
3L—6¾" Spindle Bore, 18" Chuck, 21" Swing
3AL—6¼" Spindle Bore, 21" Chuck, 27" Swing

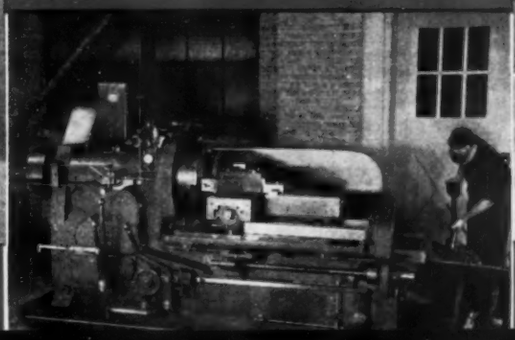


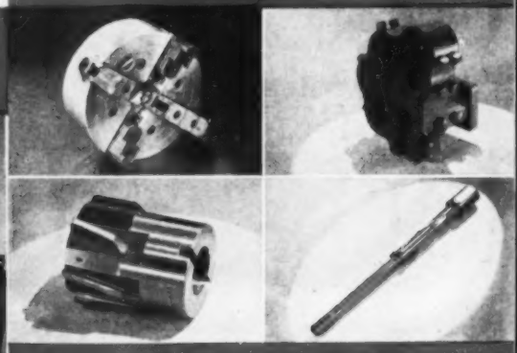
Gisholt Heavy-Duty Turret Lathes
4L—9⅛" or 12¼" Spindle Bore, 24" Chuck, 28" Swing
5L—9⅛" or 12¼" Spindle Bore, 28" or 32" Chuck, 34¼" Swing



Gisholt Balancers
Dynamic Balancers—5 Sizes Static Balancers—4 Sizes

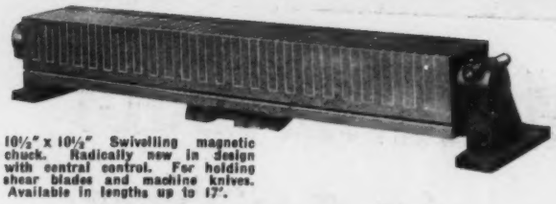
Gisholt Simplimatics
Standard Type—18" or 24" Chuck
Radial Type—18" or 24" Chuck





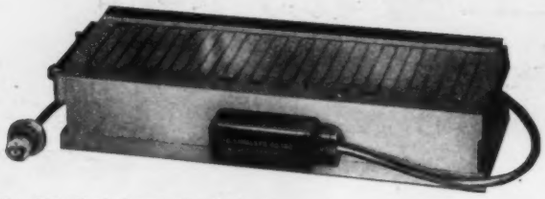
Gisholt Chucks—Gisholt Small Tools
Gisholt Reamers—Gisholt Boring Bars

WALKER MAGNETIC CHUCKS WILL
put your Machine Tools on Full Work Time

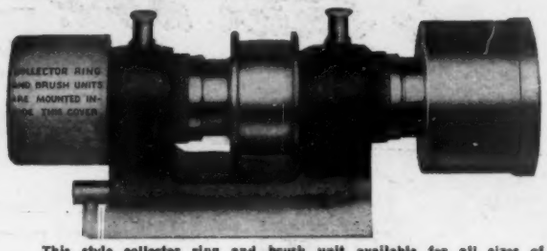


10½" x 10½" Swivelling magnetic chuck. Radically new in design with central control. For holding shear blades and machine knives. Available in lengths up to 17".

No. 617 bar pole magnetic chuck. This type specially suitable for holding small and thin work. Available in sizes from 6"x10" up to 12"x60".



No. 618 all steel magnetic chuck. This type available in sizes ranging from 4"x8" up to 30"x96".



This style collector ring and brush unit available for all sizes of rotary magnetic chucks.

These Magnetic Chucks turn setting-up time into production time and result in savings from 20 to 50% in chucking labor by eliminating slow acting jigs and fixtures for metal removing operations on lathes, shapers, drill presses, planers, grinders and similar equipment—at the same time reducing spoilage losses.

TYPE D-B

WALKER
SURFACE GRINDERS

Power . . . Rigidity . . . Accuracy . . . High Production . . . Cost Cutter . . . Quick Adjustments . . . Handles a Wide Range of Work . . . Set-up time is reduced to a minimum through the use of the *Walker Rotary Magnetic Chuck*, which is automatically magnetized and demagnetized.

SPECIFICATIONS

CAPACITY—Work up to 12" diameter, 4" high, under a new grinding wheel.

GRINDING WHEELS—Cup shaped, 8" O.D., 5½" hole; ⅝" rim and 3" deep.

WORK TABLE—12" diam. Walker Rotary Magnetic Chuck with 1⅛" hole for centering plug.

WHEEL HEAD ADJUSTMENT—Wheel head unit can be moved 4", providing for grinding work having collars up to 6" diameter.

SPEEDS—Main driving shaft 825 R.P.M., grinding wheel, 2000 R.P.M. Work Table, 60, 100, 170, also 110, 185 and 310 R.P.M.

FEEDS—Wheel head has reversible stop providing for 3" and 5" travel. Work Table operates through a range of 4"; index wheel reads in thousandths.

MOTOR DRIVE—7½ H.P. or 10 H.P., 1750 R.P.M.; silent chain drive or vee belt drive.

WATER SUPPLY—Streams provided for adequate volume both inside and outside grinding wheel; tank capacity, 30 gallons.

STANDARD EQUIPMENT—12" Rotary Magnetic Chuck; 1 chuck ring; 2 grinding wheels mounted; 2 extra wheel mounts, diamond dresser, wrenches, wheel head lock, motor base, etc.

FLOOR SPACE—61½" x 68".

O. S. WALKER COMPANY, Inc.
Worcester Mass.

EXCLUSIVE DESIGN AND CONSTRUCTION FEATURES

Boring-Tool

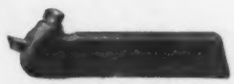
Light Boring-Tool

Knurling-Tool

Knurling-Tool

Cutting-Off and Side-Tool

Threading-Tool with Formed Cutter



Turning-Tool

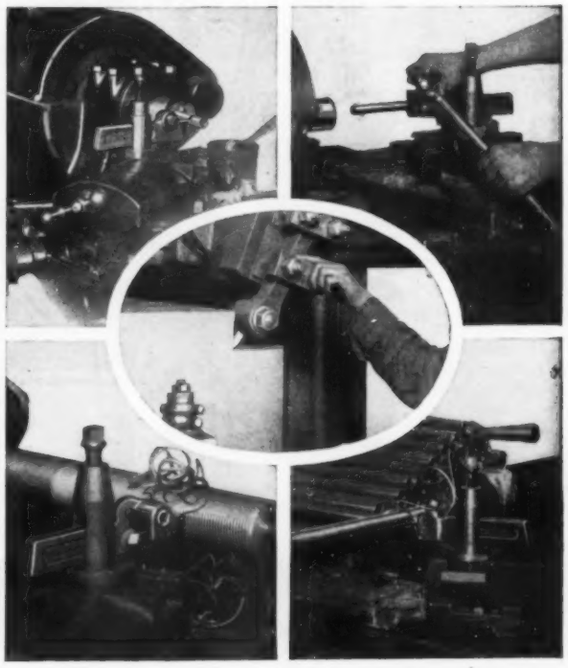
Planing-Tool

ASSURE Better Cutting at Lower Cost

● "AGRIPPA" Tool Holders by Williams are so designed and constructed as to contribute speed, efficiency and greater profit to every regular operation of lathe, planer and shaper. All are drop-forged, carefully broached, accurately machined and specially hardened. "Agrippa" construction assures a solid cutter seat and a chatter-proof, clean-cutting tool. For better cutting at lower cost—choose "the Holders that Hold." See your distributor.

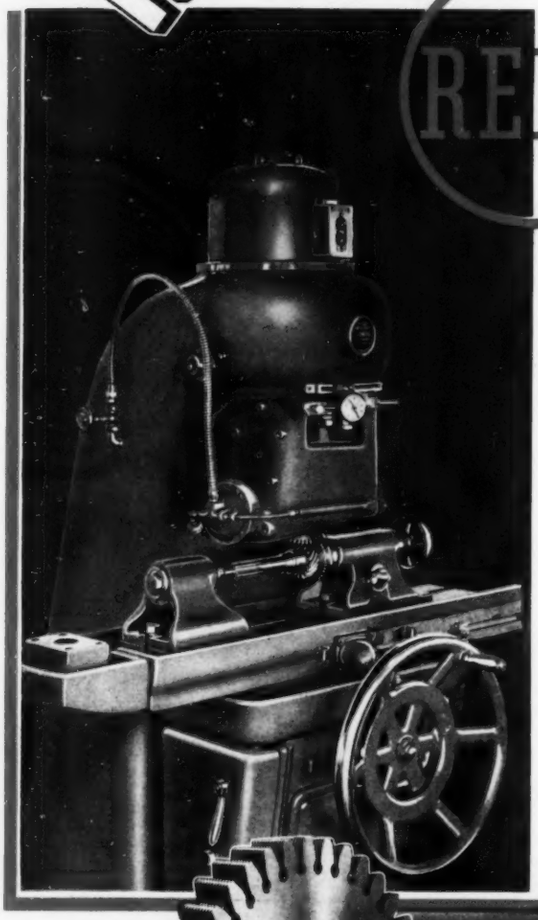
J. H. WILLIAMS & CO.
75 Spring St., New York

Headquarters for: Drop-Forged Wrenches (Carbon and Alloy), Detachable Socket Wrenches, "C" Clamps, Lathe Dogs, Tool Holders, Eye Bolts, Hoist Hooks, Thumb Nuts and Screws, Chain Pipe Tongs and Vises, etc., etc.



REDUCE GEAR FINISHING TIME TO SECONDS

RED RING ROTARY CROSSED AXIS GEAR SHAVING MACHINE

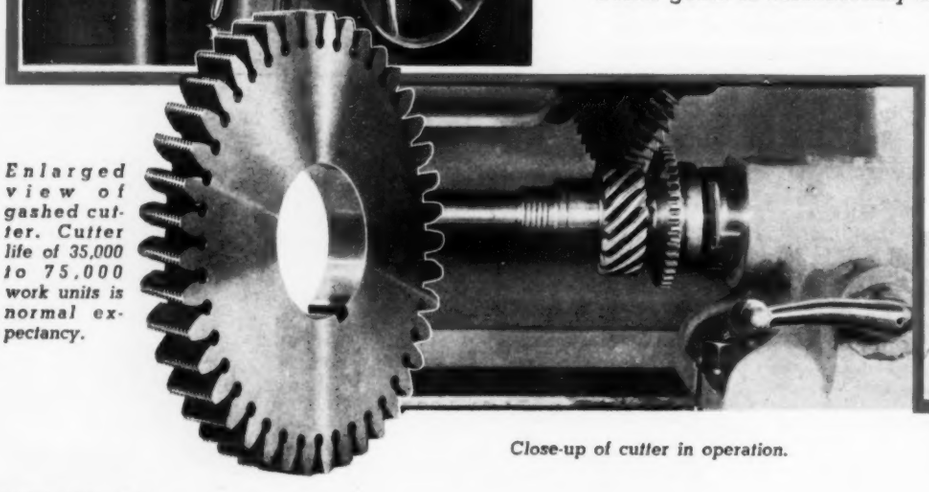


Higher speed . . . better finish . . . characterizes the work of the Red Ring Gear Shaving Machine. It will finish a 20 tooth gear, 9.25 pitch, 20° pressure angle, 35° helix angle, in 20 to 40 seconds floor to floor, depending on the stock to be removed. Other gears are handled with corresponding speed.

Profile . . . index . . . eccentricity . . . and helix angle are corrected to high precision. Profile, for example, is brought to within 0.0001" of true involute. Surface of teeth is rendered bright and smooth . . . no squeal when such gears are run at high speed.

The machine employs limited crossed axis shaving at high speed. The cutter is a helical gear with gashed teeth. Fast cuts at slow feed . . . resembling fly cutter work . . . are taken as the cutter runs in mesh with the work gear. Action is *cutting* . . . not burnishing. No metal is compressed to rebound in heat treatment.

Write for complete data on the Red Ring Shaver. It produces better gears at considerably lower cost.



Enlarged view of gashed cutter. Cutter life of 35,000 to 75,000 work units is normal expectancy.

Close-up of cutter in operation.

Chips full size and magnified four times to show clean cutting action.

PATENTS APPLIED FOR AND ISSUED — 1989650, 1989651, 1989652

NATIONAL BROACH & MACHINE COMPANY

SHOEMAKER & ST. JEAN DETROIT, MICHIGAN

Open gears *need* the protection of GULF LUBCOTE

. . . a heavy bodied lubricant with remarkable adhesiveness and lasting qualities

HERE is a special petroleum lubricant which is solving gear lubrication problems for many machine shop operators. Gulf Lubcote combines exceptionally high adhesiveness for metal surfaces with natural high viscosity and efficient lubricating qualities for specific requirements.

Gulf Lubcote effectively cushions gear teeth and resists the wiping action of gears in motion. It retains its original fluidity and high lubricating qualities to a remarkable degree, resisting heat and decomposition.

Use Gulf Lubcote to lengthen the life of your gear-trains and keep them operating without noise. You will be pleased with the results.

FOUR REASONS... WHY GULF LUBCOTE IS THE LUBRICANT OF UNPARALLELED QUALITY FOR OPEN GEARS

1 GULF LUBCOTES are heavy bodied products especially manufactured to have the requisite property of high adhesiveness for metal surfaces necessary in lubricants for open gears.

2 Due to selected crudes used and to the process of refinement employed, GULF LUBCOTES possess unusual lubricating qualities together with the essential property of flowing with the movement of the gear and pinion teeth.

3 The lubricating film provided by GULF LUBCOTES, in addition to being impervious to moisture, acid fumes and gases, will withstand extreme temperature changes without deterioration.

4 Due to the tough and tenacious nature of GULF LUBCOTES they will effectively reduce objectionable gear noise and at the same time will provide maximum protection against corrosion, pitting or excessive wear of the gear teeth.

GULF OIL CORPORATION

GULF REFINING COMPANY

GENERAL OFFICES: GULF BLDG., PITTSBURGH, PA.

GULF INDUSTRIAL LUBRICATION

Outstanding tool development of the year!

CONNECTICUT
DURAKEEN
DURABILITY *with* KEENNESS
BROACHES

25% to 35% Longer Broach Life

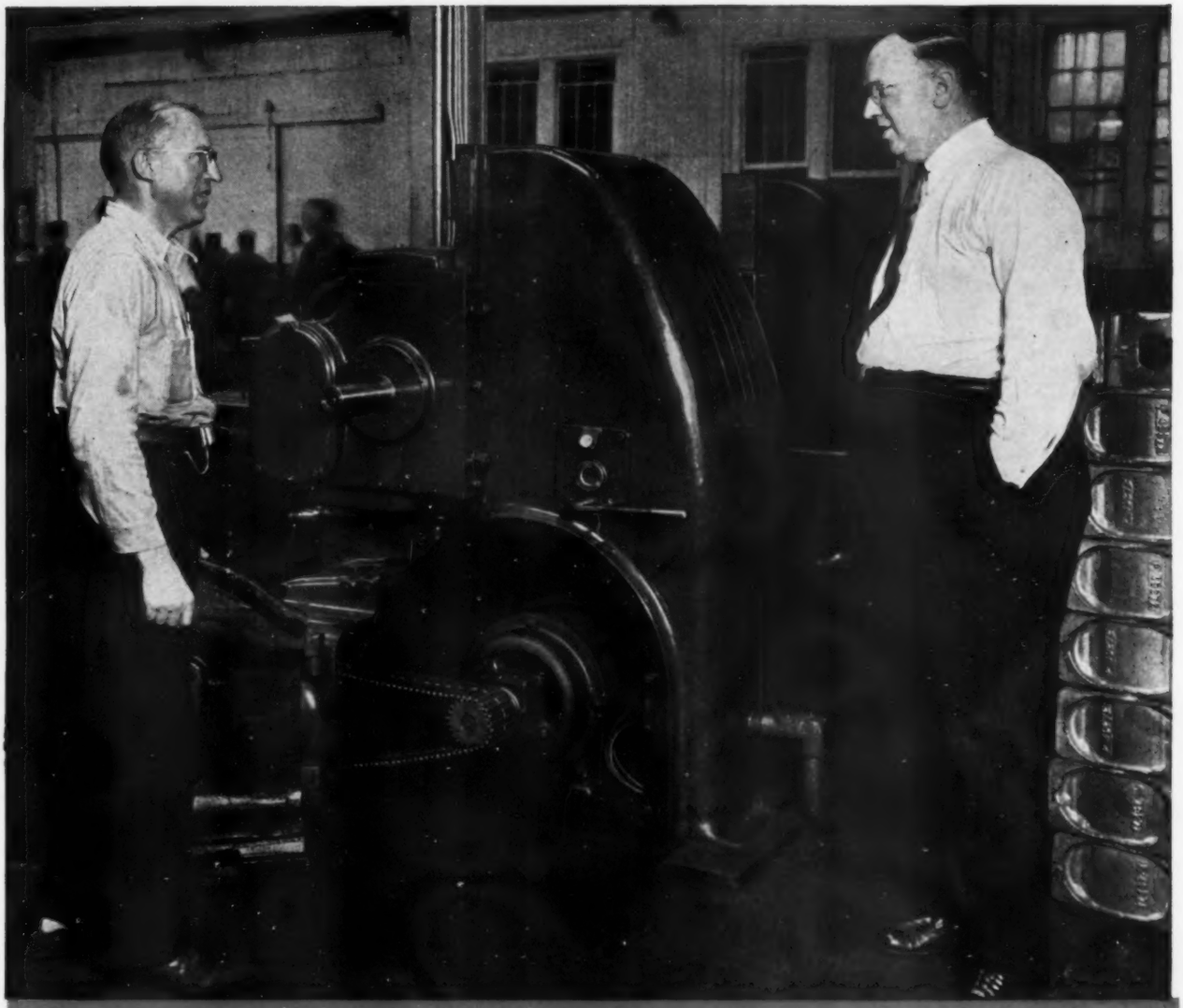
Do you work with the new hard alloy steels? Are you broaching hardened steel parts *after heat-treatment?* Do you want lower costs per broached piece on *all* classes of broaching? Then investigate these NEW Durakeen Broaches.

A recent development in steel making has been combined with a new precision heat-treatment to give exceptional toughness with extreme hardness. Abrasion resistance is inherent in the new steel. Hence Durakeen Broaches give more pieces per grind and more grinds per broach . . . 25% to 35% added tool life.

Durakeen Broaches have demonstrated their ability to handle the hardest of the newer steels on an economical production basis . . . Steels like 18-8 stainless and SAE 6150, with a hardness after heat-treatment of 45 Rockwell. Work considered impossible to broach up to now has been performed with entire satisfaction.

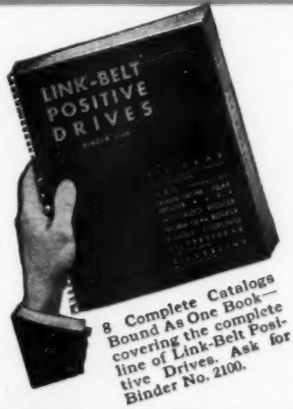
Let us make up a broach for you to this new specification. Your production cost records will amply prove our claims.

The CONNECTICUT BROACH and MACHINE CO.
NEW LONDON, CONN.



"Sure—we get Better Results with the LINK-BELT ★Silverstreak Silent Chain Drive"

★ T. M. REG. U. S. PAT. OFF.



8 Complete Catalogs Bound As One Book—covering the complete line of Link-Belt Positive Drives. Ask for Binder No. 2100.

● "That's why we're not only turning out more work—more pieces per hour, but we're getting a better finish. Every R. P. M. of the motor is transmitted to the machine in a smooth, even 'flow.' This causes the tool to cut away the metal without tearing or chattering."

Further, the Link-Belt silent chain drive is always dependable, long-lived, is easy to install, and requires no upkeep expense and little attention. Link-Belt Company, Philadelphia, Chicago, Indianapolis, San Francisco, Toronto. Other offices located in principal cities. Send for catalogs.

5822

LINK-BELT *positive* DRIVES INCLUDE

SILENT CHAIN DRIVE

ROLLER CHAIN DRIVE

P.I.V. GEAR SPEED VARIATOR

V.R.D. VARIABLE ROLLER DRIVE

HERRINGBONE GEAR REDUCER

MOTORIZED REDUCER

WORM GEAR REDUCER

"WE'RE CHANGING OVER ALL OUR MACHINES TO *Dayton V-Belt Drives*"

● This photograph was taken in a plant now using several hundred Dayton Cog-Belt Drives.

"These drives have effected many savings," said the master mechanic. "Power savings, lower maintenance costs, and the saving of valuable floor space."

And in thousands of plants where Dayton V-Belt Drives are in use, the story is the same.

The patented construction of Dayton V-Belts gives them many outstanding advantages found in no other V-Belts—advantages that are now recognized by factory executives everywhere.

Dayton V-Belts are "built-to-bend." They are die-cut, not molded, and accurately fit the grooves of all standard pulleys. Their rigid crosswise construction prevents distortion—there is no slipping or weaving. This means smoother running... positive speed... less tension... less wear on bearings. Machines last longer and there's practically no maintenance cost.

Whether for fractional or a thousand horsepower, there's a Dayton V-Belt Drive for the job. May we send you complete information?

THE DAYTON RUBBER MANUFACTURING COMPANY, DAYTON, OHIO

The World's Largest Manufacturers of V-Belts—Manufacturers also of Dayton Fan Belts, Dayton Red Tube Radiator Hose and the famous Dayton Thorobred Tires and Tubes

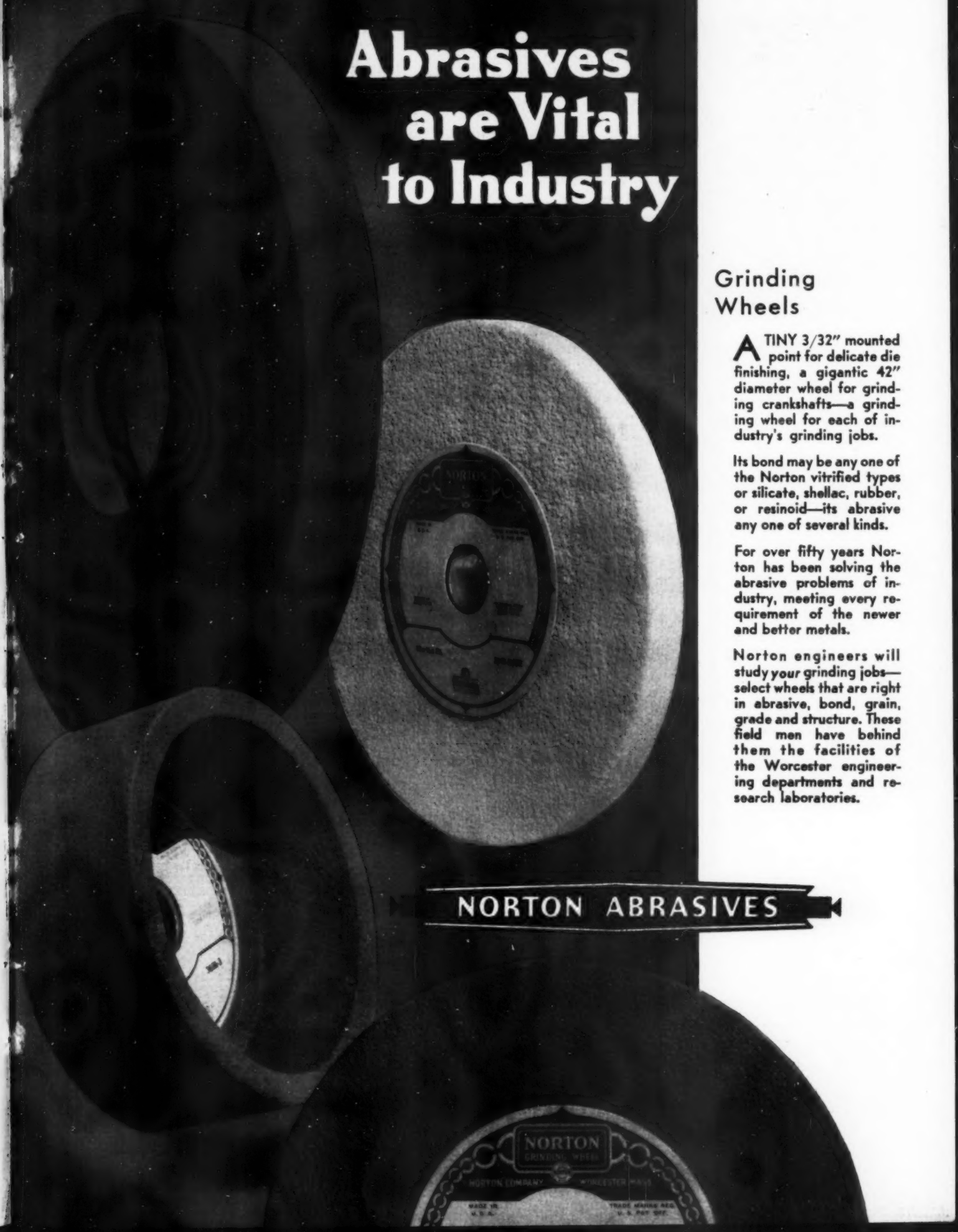
COG-BELT DRIVES—F.H.P. V-BELT DRIVES—DAYCOIL OIL-PROOF V-BELTS—COMPLETE DRIVES, PULLEYS AND BELTS IN STOCK

COMPACT • DURABLE • EFFICIENT

Dayton

COG-BELT DRIVES

Abrasives are Vital to Industry



Grinding Wheels

A TINY 3/32" mounted point for delicate die finishing, a gigantic 42" diameter wheel for grinding crankshafts—a grinding wheel for each of industry's grinding jobs.

Its bond may be any one of the Norton vitrified types or silicate, shellac, rubber, or resinoid—its abrasive any one of several kinds.

For over fifty years Norton has been solving the abrasive problems of industry, meeting every requirement of the newer and better metals.

Norton engineers will study *your* grinding jobs—select wheels that are right in abrasive, bond, grain, grade and structure. These field men have behind them the facilities of the Worcester engineering departments and research laboratories.

Abrasives for Polishing

METAL PRODUCTS are polished with Alundum abrasive. Different grain shapes and treatments make it possible to meet all requirements — heavy duty polishing or fine finishing. For the jobs that demand a super-fine abrasive (such as buffing metallographic specimens) there's Norton Levigated Alumina. And for the jobs that require a super-hard abrasive there is Norbide—hardest substance made by man for commercial use. Crystolon abrasive is the choice for polishing glass and stone. It is also widely used for gear lapping.

•

SHARPENING STONES and coated abrasive products (commonly known as sandpaper and emery cloth) are supplied by Behr-Manning Corporation, a division of Norton Company. Oilstones are made in all the varieties and sizes needed by industry as well as the home workshop—India (Alundum abrasive) and Crystolon stones and the natural stones known as Hard Arkansas, Soft Arkansas and Washita. Behr-Manning Abrasive Papers and Cloths are made in sheets, rolls and discs and with many different coatings — both manufactured and natural abrasives. When in the market look for the identifying mark "Norton Abrasives."

Oilstones and Abrasive Specialties

Alundum, Crystolon and Norbide are registered trade-marks registered in the U. S. Patent Office.

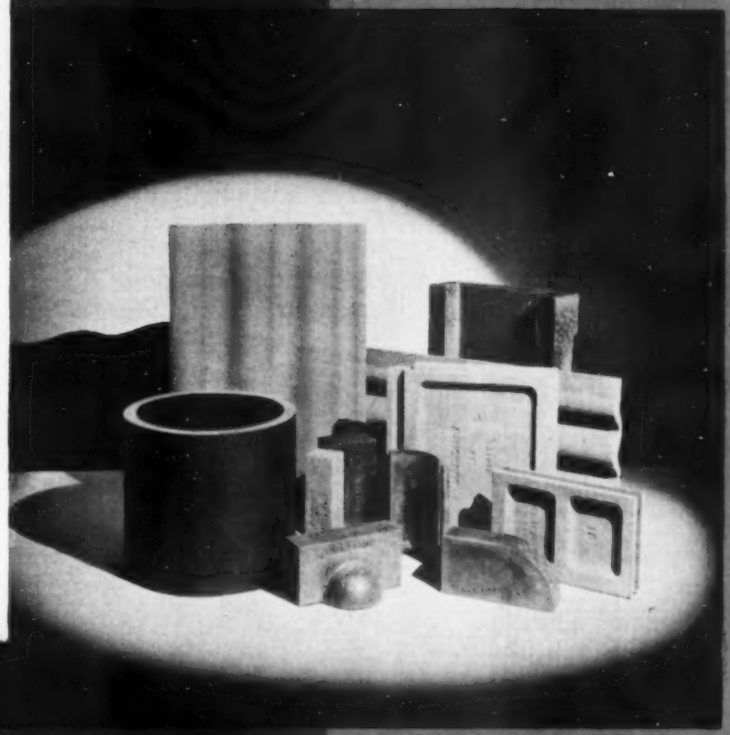
NORTON ABRASIVES

REFRACTORY PROPERTIES also make the electric furnace products, fused alumina (Alundum) and silicon carbide (Crystolon), extremely valuable to industry. In the laboratories Alundum Ware is widely used—tubes, cores and muffles for electric furnaces; crucibles and dishes for igniting, incinerating and melting; dishes, cones, discs, thimbles and crucibles for filtering; pyrometer tubes and refractory cements. Norton Combustion Boats and RR Alundum Grain are especially popular for carbon determinations in steel analyses.

•

FOR HANDLING HEAT in places where super-temperatures are encountered and conditions are severe, there is a wide and varied line of Norton Refractories. For use at the clinker line in hand or stoker-fired boiler furnaces there are Crystolon Brick. Heat-treating furnace lining costs are cut by long-lived Crystolon Hearth Plates. Induction furnaces for melting ferrous and non-ferrous metals are lined with Norton Fused Magnesia Cements. In enameling furnaces and ceramic kilns Alundum Plates (plain or corrugated) reduce maintenance costs. For aeration, filtration and diffusion industry uses Norton Porous Tubes and Plates.

Laboratory Ware



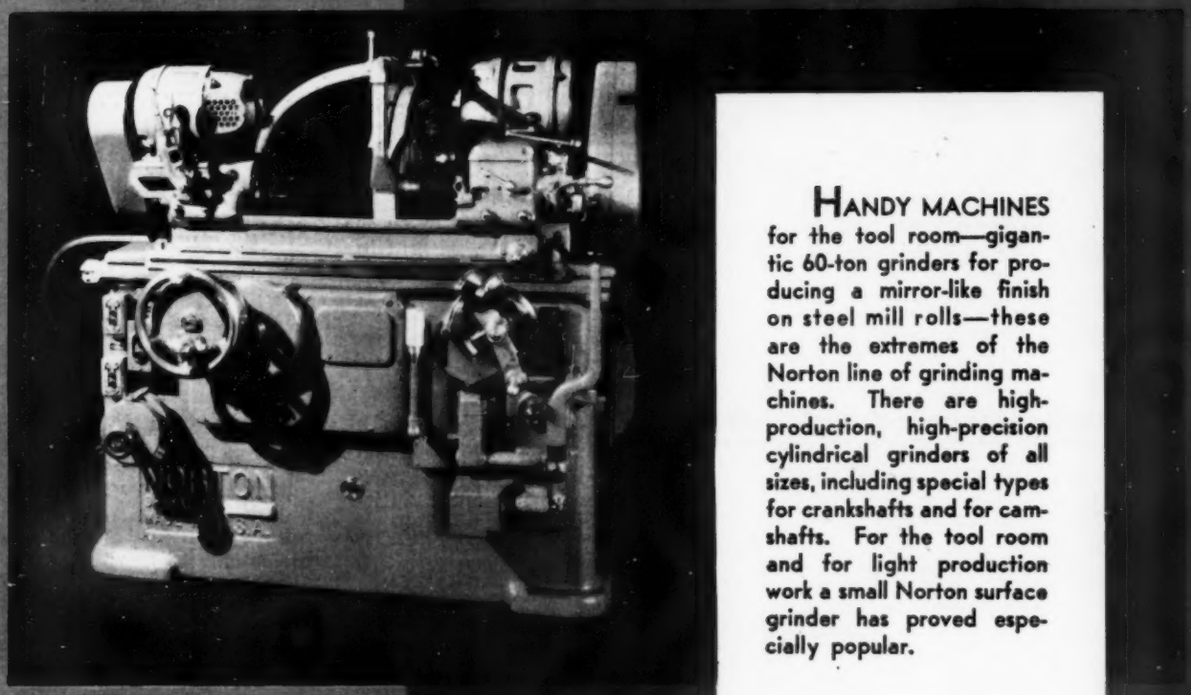
Heavy Duty Refractories

NORTON COMPANY, WORCESTER, MASS.

New York Chicago Detroit Philadelphia Pittsburgh
Hanford Cleveland Hamilton, Ont. London Paris
Wesseling, Germany Corsico, Italy

BEHR-MANNING DIVISION, TROY, N. Y.

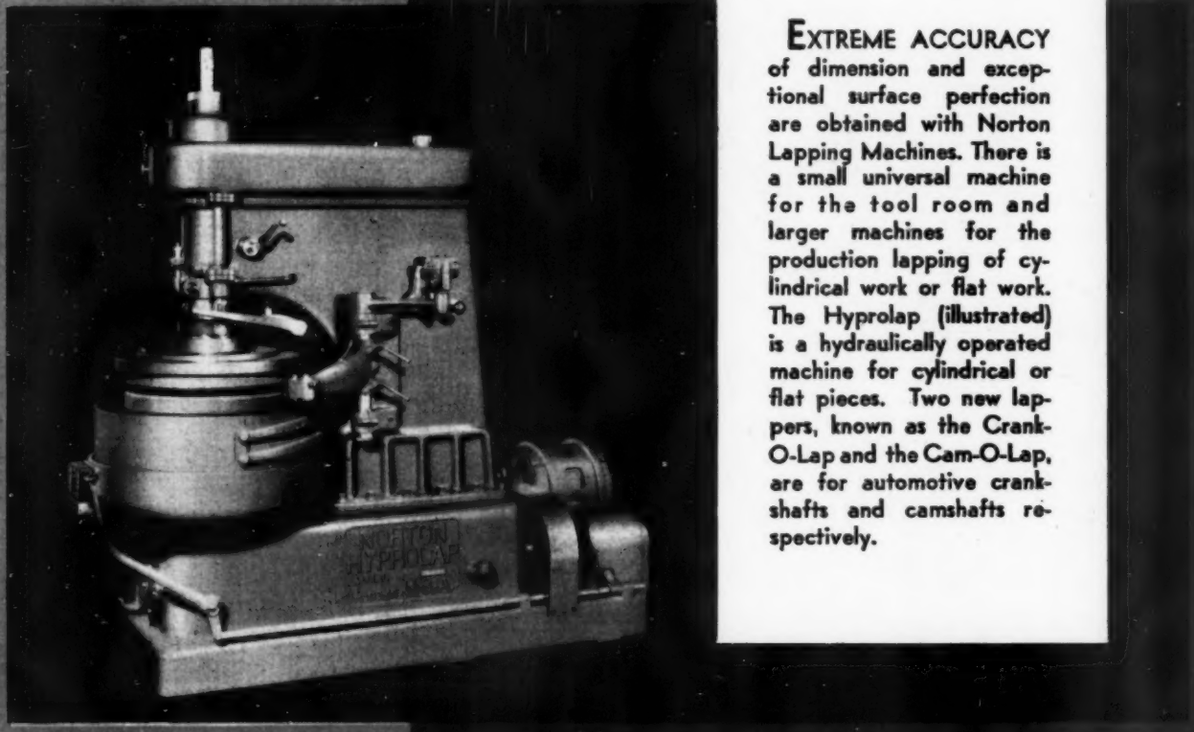
NORTON REFRACTORIES



Grinding Machines

HANDY MACHINES for the tool room—gigantic 60-ton grinders for producing a mirror-like finish on steel mill rolls—these are the extremes of the Norton line of grinding machines. There are high-production, high-precision cylindrical grinders of all sizes, including special types for crankshafts and for camshafts. For the tool room and for light production work a small Norton surface grinder has proved especially popular.

•

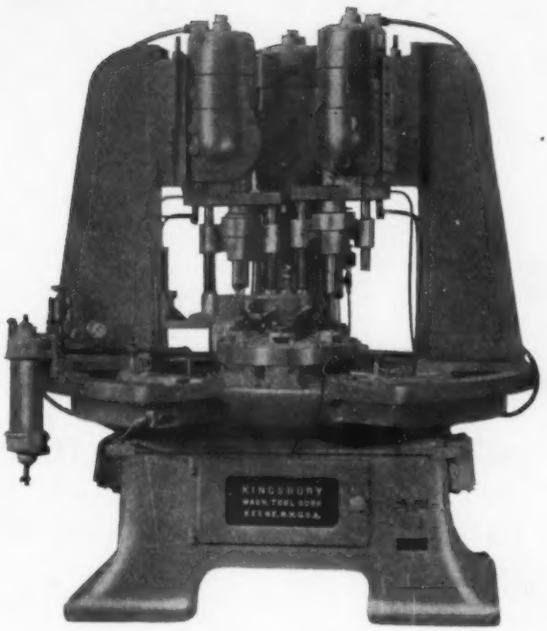


Lapping Machines

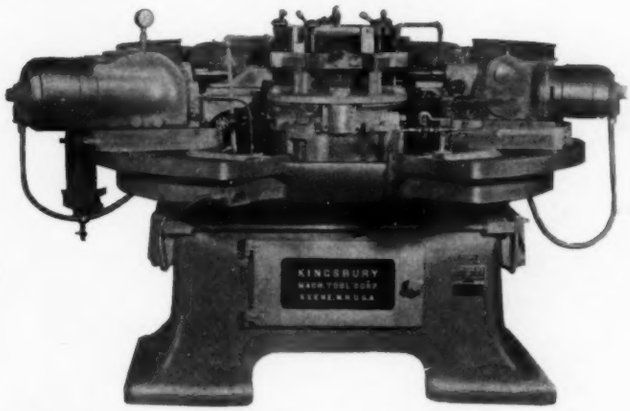
EXTREME ACCURACY of dimension and exceptional surface perfection are obtained with Norton Lapping Machines. There is a small universal machine for the tool room and larger machines for the production lapping of cylindrical work or flat work. The Hyprolap (illustrated) is a hydraulically operated machine for cylindrical or flat pieces. Two new lappers, known as the Crank-O-Lap and the Cam-O-Lap, are for automotive crankshafts and camshafts respectively.

NORTON MACHINES

The OPERATOR *Chucks the Work* *The* MACHINE *Finishes the Job*



The accompanying illustrations show a few of the hundreds of indexing or turret types of machines, built by us, in which the operator has only to chuck the piece of work; after which a variety of operations are performed successively and automatically.



All of these machines are built up from standard KINGSBURY Units, and represent typical examples of the many combinations in which Kingsbury Automatic Drilling, Milling, and Indexing Units are assembled. Not only great speed, but a high degree of accuracy is obtainable with KINGSBURY Machines because the various operations are performed in sequence without disturbing the work in the fixture.

We invite manufacturers to send us blue prints or samples of any work which requires more than one drilling, tapping, reaming, chamfering, or milling operation. Our Engineers will be glad to figure out what they believe to be the most economical and efficient combination of KINGSBURY UNITS to meet the production requirements specified. This service involves no charge or obligation, and may easily help you to achieve important savings.

AUTOMATIC DRILLING *by the* KINGSBURY METHOD

KINGSBURY MACHINE TOOL CORP.
KEENE, NEW HAMPSHIRE
Originators of the Automatic Drilling Head Unit

Cost troubles! They're common among steel parts producers. What steel? What manufacturing methods will shave down expenses?

If a steel that is free machining and yet has high physical properties would solve your problem, consider Union Hymo. This steel has put the right qualities into a lot of jobs where other screw stocks failed and has replaced other high grade steels because it speeded up production.

Union Hymo comes nearest to being a general purpose steel. It has superior physical properties and the characteristics for rapid machining and carburizing processes that are just suited for a wide scope of uses.

UNION DRAWN STEEL CO.
MASSILLON, OHIO

A SUBSIDIARY OF REPUBLIC STEEL REPUBLIC STEEL CORP.

Union Cold

Drawn Steels

This Advertisement based on data recorded in our Engineering Files

Smoothly

they operate—

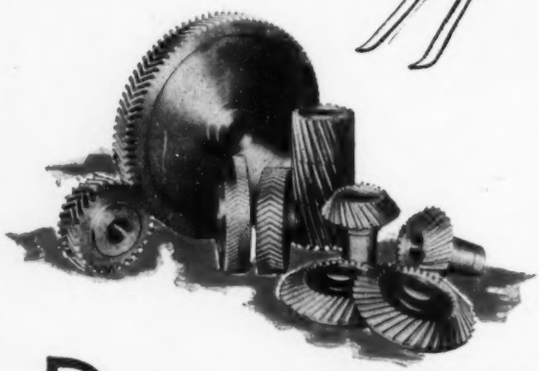
perfectly fitted—

in perfect mesh—

With the smoothness—the ease—and the perfect balance of the experienced in the difficult art of skiing, PHILADELPHIA GEARS glide along, each tooth engaging precisely, each revolution a study in smoothness of motion.

Such performance is visible assurance of the power-stingy precision with which PHILADELPHIA GEARS always operate. It is definite evidence of quiet, vibrationless, even transmission of developed power by the gears you buy. It is a hall-mark of Quality, built-in by skilled gear makers machining each tooth to the hair-line precision that guarantees perfect mesh.

And, remember, whatever your gear requirements—no matter how large or small, simple or complicated, few or many—PHILADELPHIA *can deliver promptly!*



●FROM AN ENGINEER'S NOTEBOOK
—gleanings from a wealth of practical experience available to you, in facsimile form, upon request. Write, today!

PHILADELPHIA *Gears* ARE ACCURATE

PHILADELPHIA GEAR WORKS

Industrial Gears and Speed Reducers

ERIE AVENUE AND G STREET, PHILADELPHIA

Forty-three pages in our new General Catalog 51 are devoted to stock spur gears manufactured by us. These are made from Steel, Cast Iron, Brass, Textolite, and Fabroil. Every one of these spurs is a stock item. Simplify your spur gear problem—select your gears from our General Catalog 51—then order from stock. To best serve you Boston Spur Gears are carried in stock in forty-five distribution centers throughout the country. Boston Stock Gears are better than special gears.

BOSTON GEAR WORKS, INC., NORTH QUINCY, MASS., U.S.A.

SEND FOR YOUR FREE COPY OF GENERAL CATALOG 51

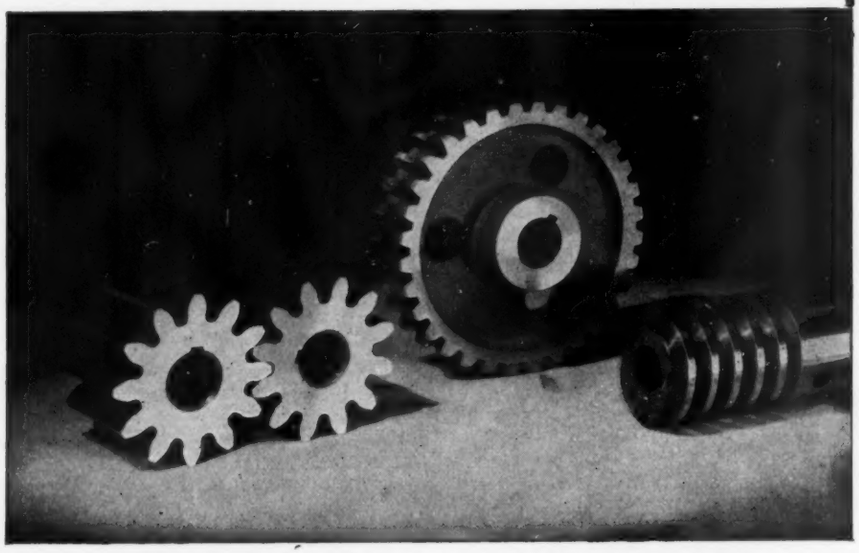
BOSTON GEARS

LARGE PRODUCTION

of

PERKINS GEARS

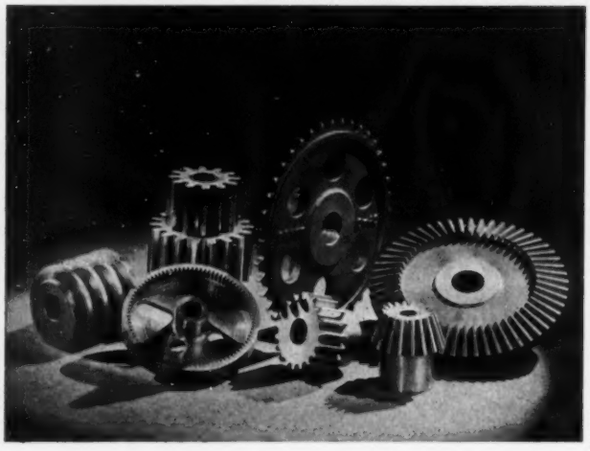
ASSURES
UNIFORM
QUALITY
AT LOW COST



BY furnishing hundreds of manufacturers of motor-driven equipment with part or all of their gear requirements we are able to operate many modern automatic or semi-automatic machines at a uniformly high load factor—thereby reducing overhead costs far below the usual figure for this class of work. For the same reason we are able to maintain a large force of engineers and skilled operators who are specialists in the production of high class gears for all purposes. This combination of specialized personnel and superior manufacturing facilities is at your service—to function as a division of your own plant. Why not take advantage of the uniform quality thus made possible at moderate cost?

The first step is to send us your blue prints and specifications.

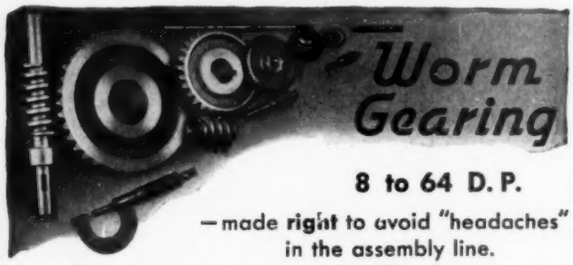
Perkins Machine & Gear Co. 130 Circuit Ave., Springfield, Mass.



In addition to the technical knowledge gained by the longest experience in the industry, Grant offers exceptional service in delivery. A complete stock of standard gears is always on hand for immediate shipment.

GRANT GEAR WORKS
BOSTON

Sixtieth GRANT YEAR 1877-1937



Worm Gearing

8 to 64 D. P.

—made right to avoid "headaches" in the assembly line.

Gear Specialties
INCORPORATED
2635 W. CANTON STREET · CHICAGO
For 20 years this Company has been known as Mechanical Specialties Mfg. Co.

EARLE GEARS

Cut Spur, Bevel and Worm Gears
All sizes. Every description. Operating Machinery for Bridges, etc. "Le-s Simplex" Cold Metal Saws

THE EARLE GEAR & MACHINE CO.
4723 Stenton Ave.
Philadelphia, Pa.
110 State St., Boston, Mass.
85 Liberty St., New York City

Ganschow

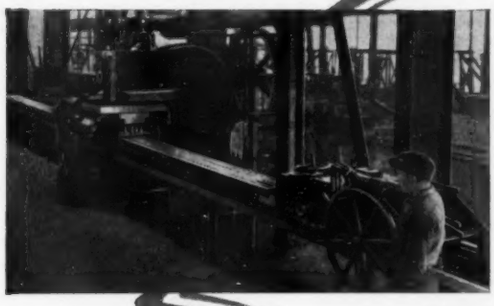
Spur—Speed Transformers—Worm

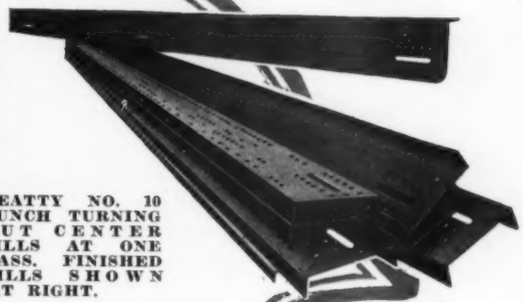
All Types of Cut Gears
4-Speed Positive Drive Reducer
Silent Laminated Steel Pinions

GANSCHOW GEAR CO., 1013 W. Washington, Chicago

BEATTY

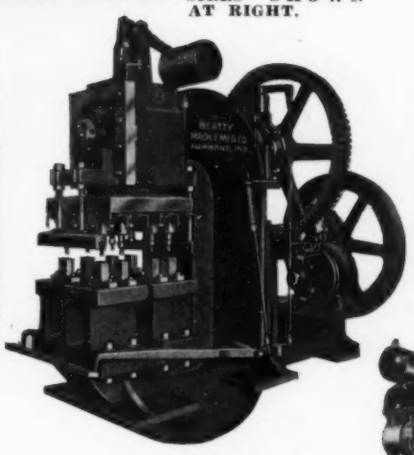
Modernized Power Punches and Shears



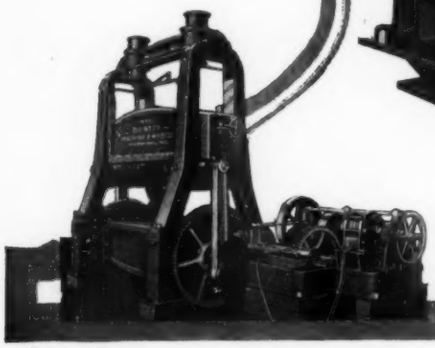


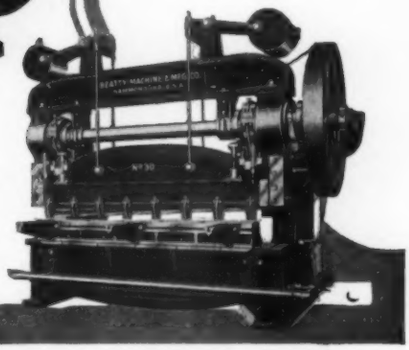
BEATTY NO. 10 PUNCH TURNING OUT CENTER SILLS AT ONE PASS. FINISHED SILLS SHOWN AT RIGHT.

Beatty equipment eliminates unnecessary handling through combination setups and large die space, enhancing production and reducing costs in some of the largest car and structural shops.



For punching and slotting center Sill Channels and Web Plates in one pass, as well as taking care of gang punching on smaller work — *"Beatty"* equipment serves best.





BEATTY NO. 9 PUNCH AND SHEAR

LEFT: BEATTY VERTICAL BULLDOZER, 350 TONS CAP.

RIGHT: BEATTY NO. 30, GATE SHEAR.

For Rapid and accurate Production work on Structural Steel Shapes and Pressed Steel Parts

The *"Beatty Line"* comprises as many different types of machines as there are Punch and Shear Requirements.

When in need of Punches, Shears, Presses, Dies, Bulldozers or Portable Cranes, let *"Beatty"* solve your problem!

Write for Catalog

BEATTY MACHINE & MFG. CO. HAMMOND INDIANA

New

. . . AND IN TUNE WITH PRODUCT AND PLANT MODERNIZATION NEEDS

The new C J B Transmission Units not only represent the most complete line offered by any manufacturer, but in addition one which embodies the only noteworthy improvements within the last two decades!

Imagine, for example, the advantages of being able to select from three distinct types of Pillow Blocks any one of nine different capacities for a given shaft size. This unusually wide range of capacities and types (see above) together with many other new and revolutionary features makes the C J B line the logical one to consider in your plant or product modernization programs.

Complete stock now carried by our 28 branches. Write for Catalog and address of nearest branch.

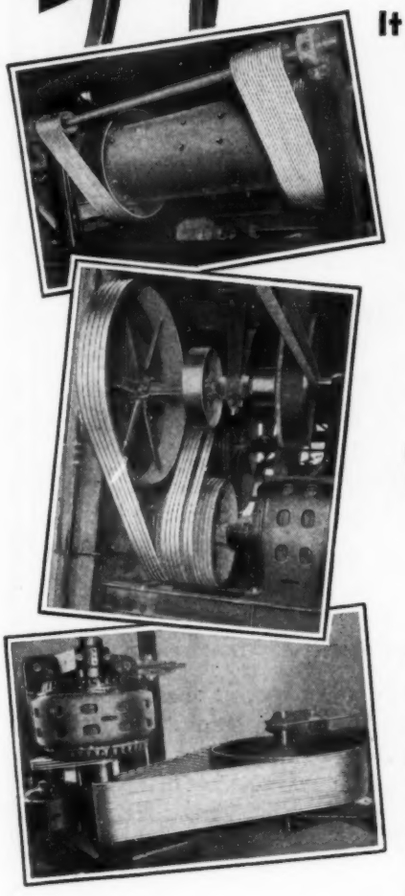
AHLBERG BEARING COMPANY
317 East 29th Street — Chicago, Illinois

CJB PILLOW BLOCKS

WRITE FOR YOUR COPY

Here is one of the most complete (and helpful) catalogs (ever) published on power transmission equipment. Every engineer and maintenance executive should have one on file. Write for your copy today.

It Shows How Your Dollars are SAVED BY THE Concave Side



Bend *any* V-belt and here is what you will notice:—The top is under tension and becomes narrower. The bottom, under compression, *widens*. These stresses distort a *straight sided* V-belt into a shape that does not fit the sheave groove—as shown in Figure 1, below. Note the out-bulge of the sides.

Fig. 1. Fig. 2.

Now look at Figure 2. Here you see that the *same shape change* merely *straightens* the precisely engineered concave side. There is no side-bulge. *Two* savings result: 1. You get *uniform* side-wall wear, *longer life!* 2. The full side-wall grip on the pulley insures against slippage on sudden load increases—a saving both in belts and *power*.

The Gates Vulco Rope is the only V-Belt built with the patented concave side.

Engineering Offices and Stocks in All Large Industrial Centers.

THE GATES RUBBER COMPANY *Factory Branches*

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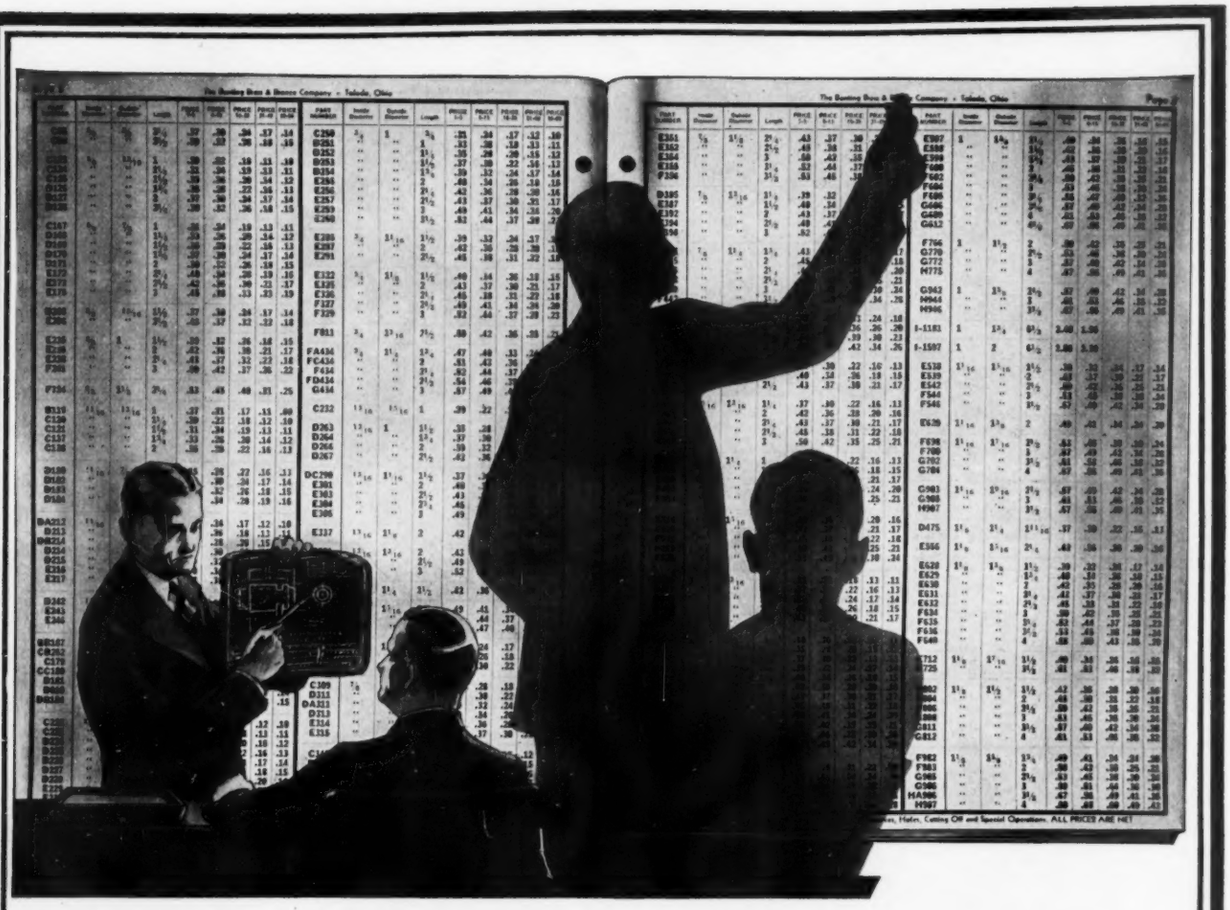
GATES VULCO ROPE DRIVES



"GET IT OUT OF STOCK"

TODAY when the need for bronze bearings is brought to executive attention the ruling invariably is "Get it out of stock."

There are more than 600 different sizes of these completely machined and finished standardized Bunting Bronze Bearings always in stock, meeting the requirements of practically every application.

Bunting also carries in stock at all times the bronze bearings, ready for assembly, required for all makes of electric motors from 1/40 hp to 60 hp.

Machined and centered 13" Cored and Solid Bronze Bars in 131 stock sizes, Anti-Friction and Genuine Babbitt are other Bunting stock products.

We will gladly place your name on our mailing list for complete catalog data on all these ready-to-use items. The Bunting Brass & Bronze Company, Toledo, Ohio. Branches and Warehouses in All Principal Cities.

BUNTING Bunting **Quality**

BRONZE BUSHINGS • BEARINGS

MACHINED AND CENTERED BRONZE BARS

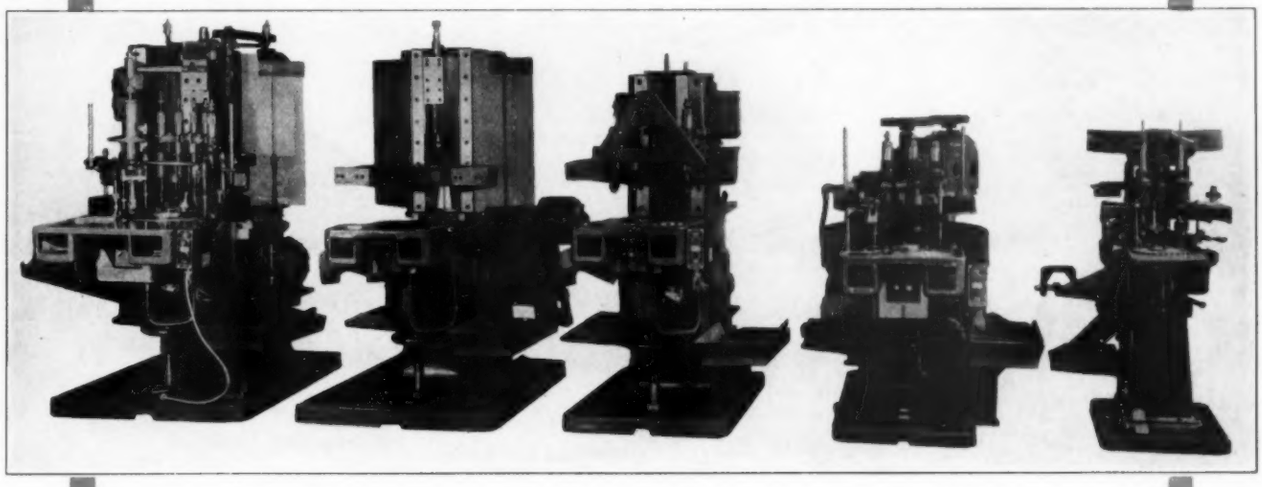
ANTI-FRICTION BABBITT

THE BODINE LINE

of Automatic Dial Feed

DRILLING, MILLING, TAPPING *and*
SCREW INSERTING MACHINERY . . .

The illustration and general specifications below indicate the limitless possibilities of BODINE Automatic Dial Feed Machines for all types of drilling, milling, tapping, and staking operations. From processing simple electrical plug contact prongs to the production of gasoline pump covers requiring both horizontal and vertical drilling and tapping spindles, Bodine machines can be adapted to suit the requirements of almost any particular job. Let our engineers study your problem and submit proposals.



Photograph above shows the complete Bodine Line partially assembled on Erecting Room floor

	Machine No. (Left to Right above)				
	48–30	48–20	42–20	40–20	40–10
Capacity in Mild Steel Taps	2½"	2½"	2⅜"	2¼"	2¼"
Capacity in Mild Steel Drills	6½"	6½"	6½"	4¼"	4¼"
Diameter of Knee	32"	24"	24"	24"	16"
Diameter of Dial	26"	18"	18"	18"	11"
Max. Speed—Strokes per Min.	30	30	40	50	60
Maximum Vertical Stroke	3½"	3½"	3"	13/16"	13/16"
Normal Size Main Motor	3 H.P.	3 H.P.	2 H.P.	1 H.P.	1 H.P.
Approximate Weight	5500 Lbs.	5000 Lbs.	4500 Lbs.	1200 Lbs.	800 Lbs.
Floor Space Required	46"x82"	46"x74"	46"x72"	40"x60"	30"x45"

THE BODINE CORPORATION

319 MOUNTAIN GROVE ST., BRIDGEPORT, CONN.

RHOADS TANNATE BELTS

ADDING TO PROFITS

Longer service life, fewer replacements, less time lost through shutdowns is a common, profitable experience of users of Rhoads Tannate Leather Belting.

From a bearing company comes the report, "When we put on a Tannate Belt we can forget the machine. Tannate Belts never give us trouble." On a grinder the belts they had used, before trying Tannate, lasted less than a year. The Tannate Belt now on the machine has been on for more than three years and "looks good as new."

Longer service life with fewer interruptions and less frequent replacements can add much to profits.

J. E. RHOADS & SONS

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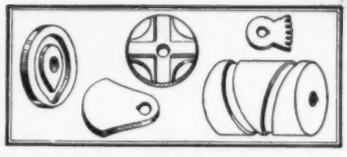
NEW YORK, 102 Beekman St. ATLANTA, 88 Forsyth St., S. W.
CHICAGO, 26 N. Clinton St. CLEVELAND, 1200 W. Ninth St.
Factory & Tannery, Wilmington, Delaware

RHOADS TANNATE

CAMS CUT TO ORDER

ALL STYLES—ANY SIZE UP TO 50" DIA.
SPECIALIZING IN CAM DEVELOPMENT
ALSO GENEVA MOTIONS



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CRAFTSMANSHIP
IS SELF-REVEALING!

● Ordinary motors won't do, out in the shop where metallic dust and particles fill the air. They won't do where corrosive gases or fumes would soon ruin a standard-type motor.

So we build a special motor for this service. Totally enclosed. Fan-cooled. Ball bearing. With fans on both ends of the motor shaft to eliminate "hot spots." And all of this without excess size (mountings are the same size as standard open types). In every line, every construction feature is motor craftsmanship at its best —craftsmanship that is self-evident when you see this great motor in operation.

If *your* service requires motors that can "take it," write for Bulletin D461, Fairbanks, Morse & Co., 900 S. Wabash Avenue, Chicago, Ill. 34 branches at your service throughout the United States.

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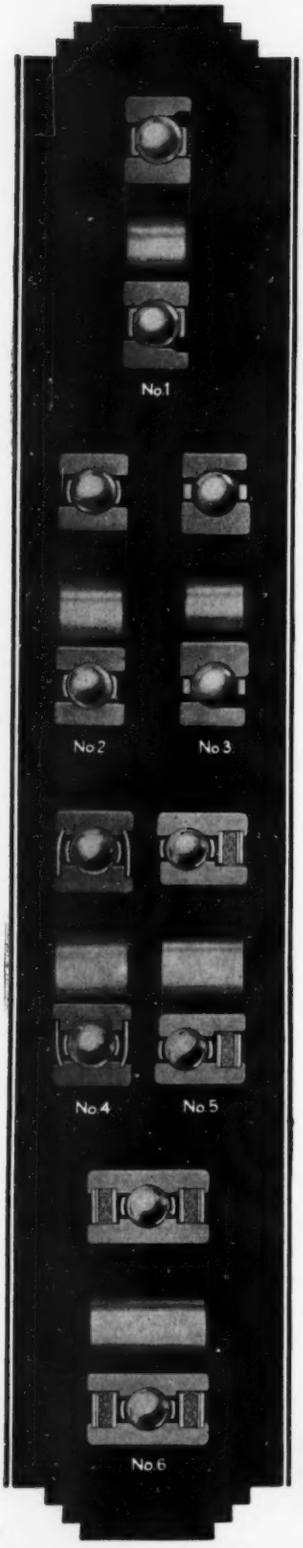
FAIRBANKS MORSE

POWER · PUMPING AND WEIGHING EQUIPMENT

Motors

PRECISION



FOR PRODUCTION AT LOWER COST

This is the objective of every executive, engineer and designer; and the performance of the bearings in a production machine is a vital factor in keeping costs down. * * * * But, in comparing bearings, look beyond first cost—look to the ultimate cost over a period of years. Let proved performance point the way to your decision. * * * * For 20-odd years, in every field of industry, **Norma-Hoffmann Precision** Bearings have been making distinguished records for unfailing dependability —records which command the confidence of those who seek the lower production costs that come with the use of better bearings.

PRECISION BEARINGS
FOR EVERY LOAD, SPEED AND DUTY

No one type of bearing is so versatile in its operating characteristics that it will meet all conditions; conditions should determine the type of bearing used. From the comprehensive **Norma-Hoffmann** line—here illustrated in part and briefly indexed —a **Precision** Bearing, or several in combination, can be chosen that will be exactly right for the duty. Let our engineers, with their specialized experience, work with you in selecting and applying bearings that will lower your production costs. Write for the Catalog.

1—Open (Separable) type ball bearing.

2—Closed, radial type ball bearing.

3—Angular contact ball bearing.

4—Plate (shielded) type ball bearing; available both with one and two grease-retaining, dirt-excluding side plates.

5—"GreaSeal" felt-protected ball bearing with single removable felt seal; available also with single removable felt seal and plate shield, fully enclosed.

6—"GreaSeal" double felt-protected ball bearing, fully enclosed, with double removable felt seal to exclude dirt and retain lubricant.

7—Double-row, self-aligning ball bearing; also furnished with adapter sleeve and nut.

8—Standard cylindrical roller bearing.

9—One-lipped cylindrical roller bearing.

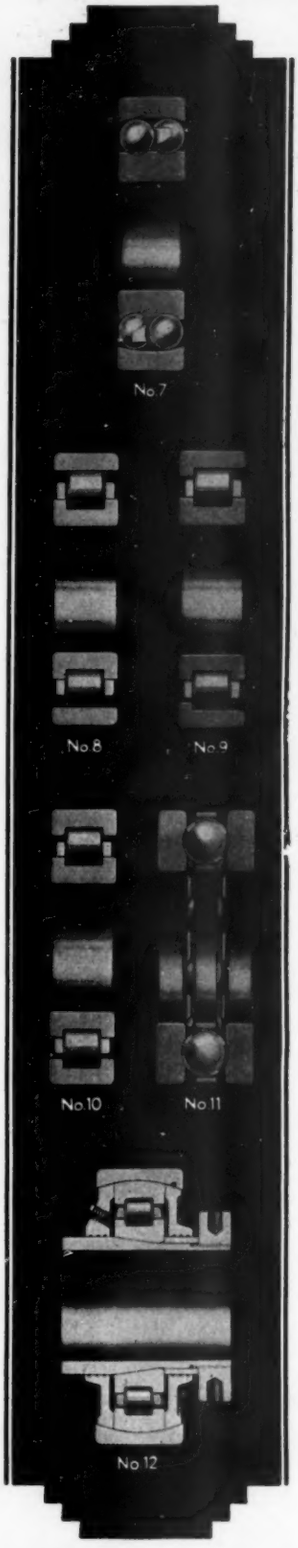
10—Two-lipped cylindrical roller bearing; available also in "full" (cageless) type with retaining rings.

11—Ball thrust bearing.

12—Self-aligning adapter type cylindrical roller bearing, wholly enclosed to exclude dirt and retain lubricant.

NORMA-HOFFMANN BEARINGS CORPORATION
Stamford, Conn., U. S. A.

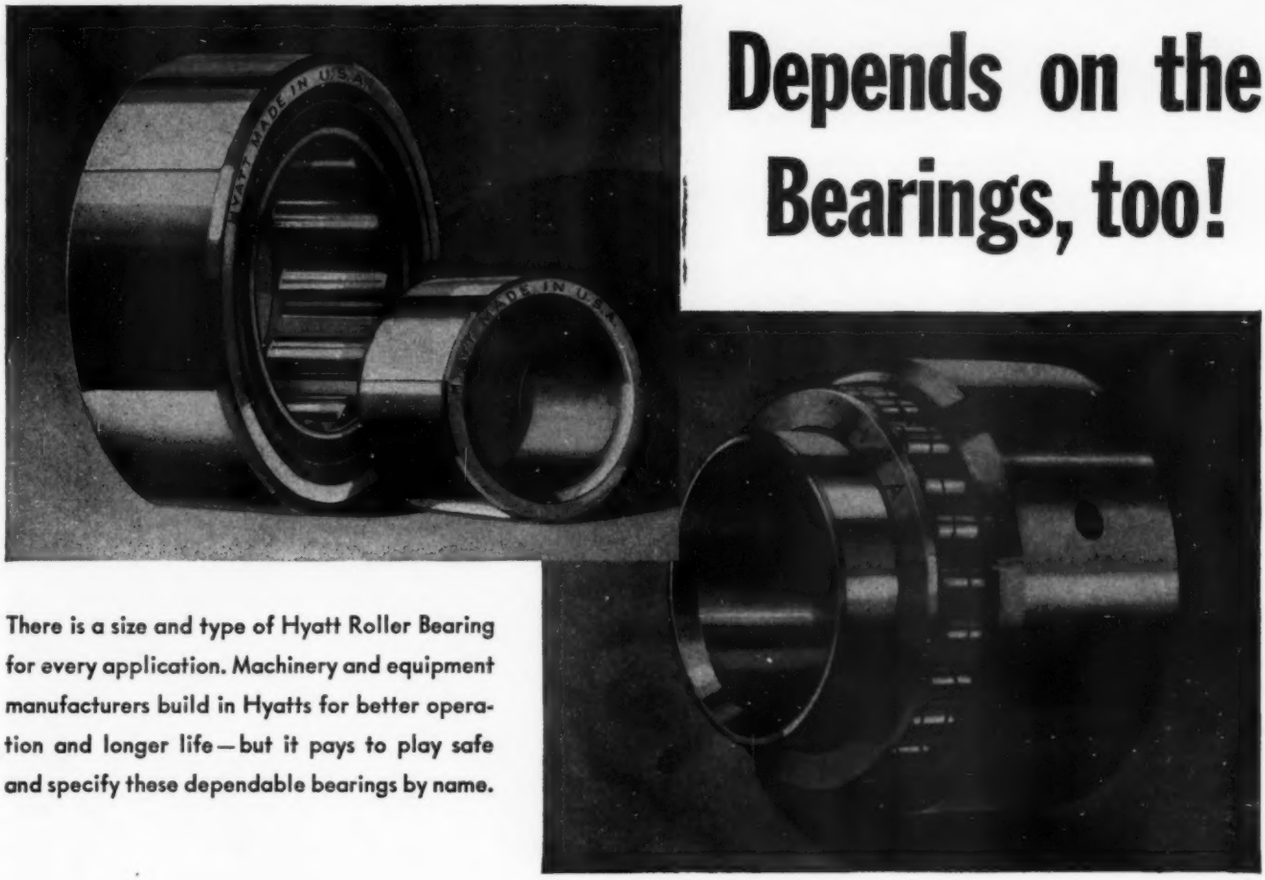
"NORMA-HOFFMANN"



BEARINGS

PRECIOUS MACHINE LIFE

Depends on the Bearings, too!



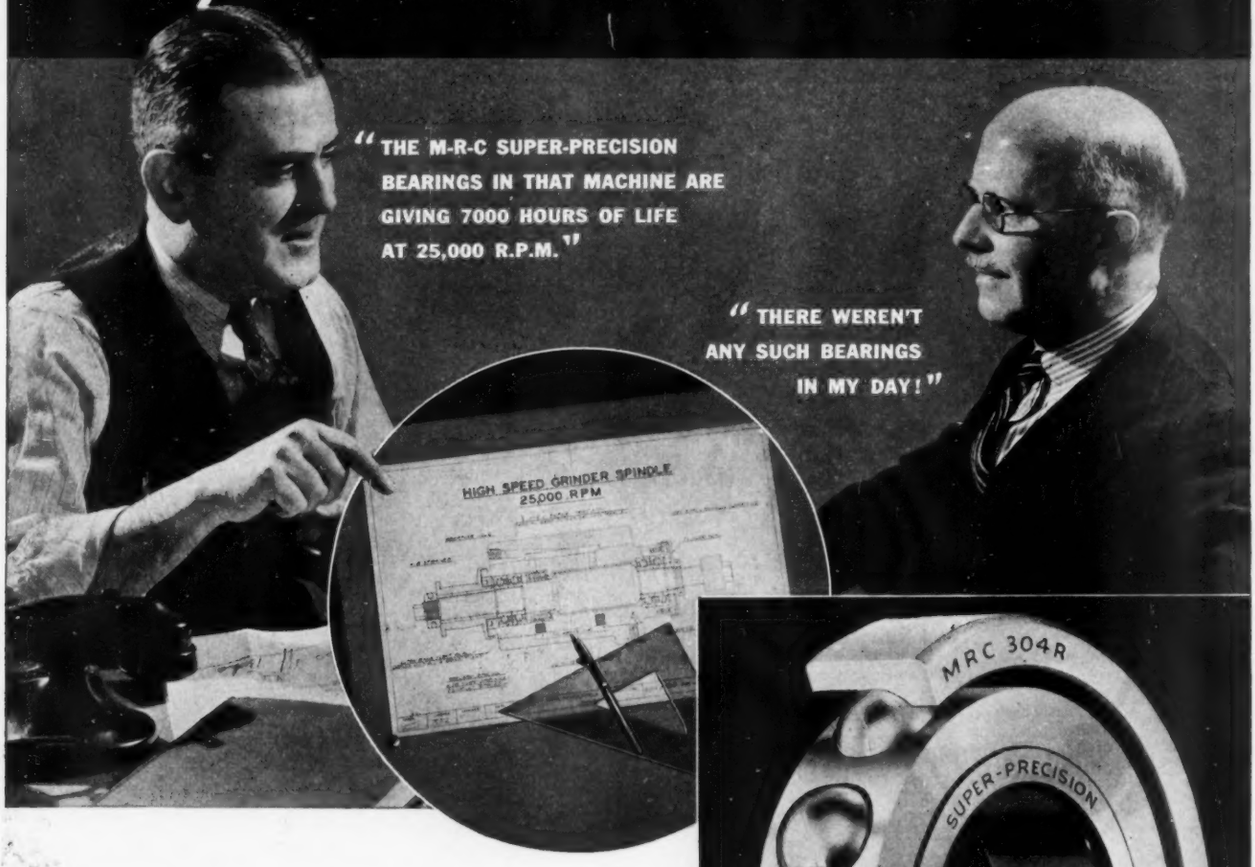
There is a size and type of Hyatt Roller Bearing for every application. Machinery and equipment manufacturers build in Hyatts for better operation and longer life—but it pays to play safe and specify these dependable bearings by name.

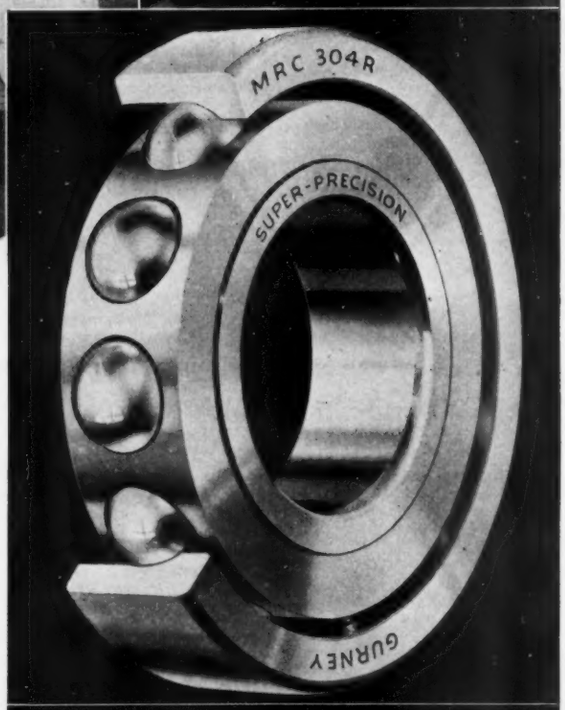
BEARINGS are a mighty important factor in the life span of all kinds of equipment. So much so, that bearings usually come in for first consideration in the original design and layout.

Mindful, therefore, of how much depends on the bearings, we at Hyatt design and build them for strength, endurance, and lasting efficiency. The widespread use and dependable performance of Hyatt Roller Bearings evidences how expertly and how excellently we have been doing our job through these many years. Hyatt Bearings Division, General Motors Corporation, Factory and General Offices, Harrison, N. J.—Mail Address: P. O. Box 476, Newark, N. J.

HYATT ROLLER BEARINGS

They said it couldn't be done!


"THE M-R-C SUPER-PRECISION BEARINGS IN THAT MACHINE ARE GIVING 7000 HOURS OF LIFE AT 25,000 R.P.M."
"THERE WEREN'T ANY SUCH BEARINGS IN MY DAY!"
HIGH SPEED GRINDER SPINDLE
25,000 RPM



M-R-C Super-Precision Ball Bearings were developed to meet the need for bearings that would give thousands of hours of service at very high speeds in production equipment. That they are doing this job successfully is proved by the many machines in service today getting satisfactory bearing life at speeds as high as 42,500 R. P. M. Learn what the M-R-C Super-Precision Ball Bearing will do for you.

MARLIN-ROCKWELL CORPORATION

Executive Offices: JAMESTOWN, N. Y.

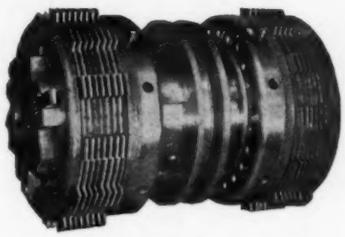
Factories at JAMESTOWN *and* PLAINVILLE, CONN.

M-R-C Strom SRB Gurney Ball Bearings

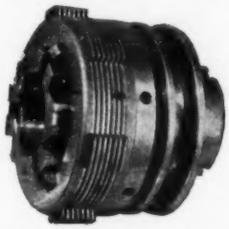
M-R-C
Ball Bearings

GURNEY ● SRB ● STROM

TWIN DISC CLUTCHES
especially designed
FOR MACHINE TOOLS



DUPLEX C.C. MODEL . OIL TYPE



SINGLE C.C. MODEL . OIL TYPE

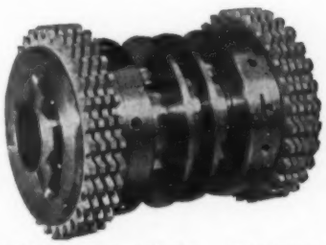
MODEL C.C. (CLOSE COUPLED) OIL TYPE

These clutches are intended for enclosed installations where they may operate in a spray of oil, or dip lightly into an oil bath, the former being the better method. Under these conditions, any heat generated is readily carried away. Contacting friction surfaces are of hard phosphor bronze and tempered saw steel. Designed so that the operating mechanism is unaffected by centrifugal action—high speeds are made possible. All clutch parts are accurately machined and carefully finished to be suitable for use on the highest grade machine tools. Operating parts are heat treated. A positive locking, single point adjustment provides very close adjustment. This provides maximum capacity with lowest operating pressures. Sizes: 2½ in. to 12 in., in both single and duplex type construction.

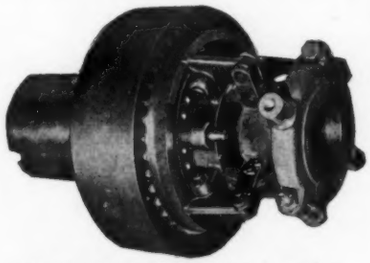
MODEL C.C. (CLOSE COUPLED) DRY TYPE

SINGLE C.C. MODEL . DRY TYPE

This type of clutch has been designed principally for machine tool installations in locations where a high grade, compact multiple disc clutch may be required. These clutches are intended to be used dry. The design follows the general lines of the multiple disc oil type C. C. clutches. Plates are of asbestos and tempered saw steel. Operating mechanism is unaffected by centrifugal action. High speeds are therefore possible. All parts machined to close tolerances and carefully finished to be suitable for use on highest grade machine tools. Operating parts are heat treated. Positive locking, single point adjustment is provided on all sizes. Plates can be adjusted as little as .003. This provides maximum capacity with minimum pressure required on operating lever. Sizes: 2½ in. to 12 in. inclusive, in both single and duplex type construction.



DUPLEX C.C. MODEL . DRY TYPE



B.F.T. TYPE CLUTCH with spider for pulley or sprocket drive.

B.F.T. SINGLE PLATE CLUTCH

STANDARD MODEL B.F.T. TYPE

are suitable for power transmission installations, such as couplings for line shafts, drives for pulleys, or for use with driving spiders carrying gears, sprockets, or pulleys. Suited for operating at speeds up to 1600 r.p.m., and are built for heavy duty services under severe conditions, in sizes from 6½ in. to 24 in. inclusive. Clutches are of the toggle action type and all sizes are equipped with Twin Disc single point adjustment. Operating parts of toggle mechanism are hardened to insure against wear and friction discs have wide faces to obtain long life. A minimum of adjustment is required. B. F. T. Clutches are equipped with gear tooth driving plates and suitable driving rings . . . and driving spiders are available for all sizes.

Write for specific recommendations. Engineering data on request.

TWIN DISC CLUTCHES

TWIN DISC CLUTCH COMPANY

1334 Racine St.
RACINE, WISCONSIN

FEDERAL

FROM FEDERAL vigilance comes FEDERAL efficiency. Vigilance begins in the laboratories checking raw materials and continues until the bearing has been shipped. Every operation on every bearing is inspected. Every finished bearing is further inspected. Constant vigilance has gained for FEDERAL an enviable reputation throughout all industries where ball bearings are used.

THE FEDERAL BEARINGS CO., INC.
POUGHKEEPSIE, N. Y.
Makers of Fine Ball Bearings
Detroit Sales Office: 2608 Book Tower
Chicago Sales Office: 120 N. Peoria St.

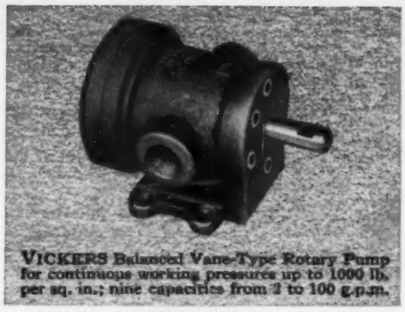
BEARINGS

VICKERS are prepared to furnish

COMPLETE HYDRAULIC FEEDS AND CONTROLS

for all kinds of machine tools and other equipment

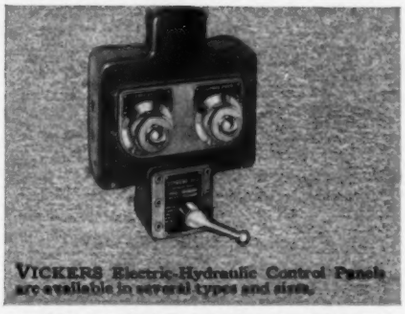
A few of the hundreds of standardized items are pictured below



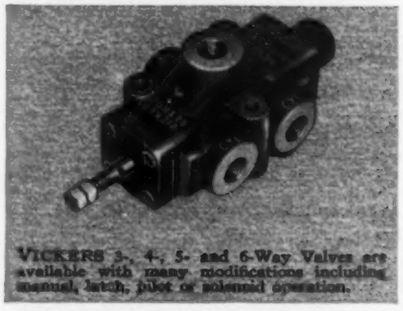
VICKERS Balanced Vane-Type Rotary Pump for continuous working pressures up to 1000 lb. per sq. in.; nine capacities from 2 to 100 g.p.m.

VICKERS Balanced Vane-Type 2-Stage Rotary Pump for pressures to 2,000 lb. per sq. in.

VICKERS Combination Pump and Valve Unit delivers large volume at low pressure and small volume at high pressure.

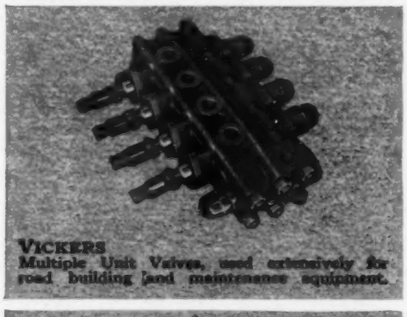


VICKERS Electric-Hydraulic Control Panels are available in several types and sizes.



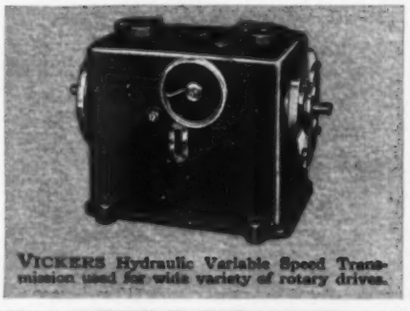
VICKERS 3-, 4-, 5- and 6-Way Valves are available with many modifications including manual, latch, pilot or solenoid operation.

VICKERS Balanced Gear Fluid Motor provides efficient and compact variable speed rotary drives.

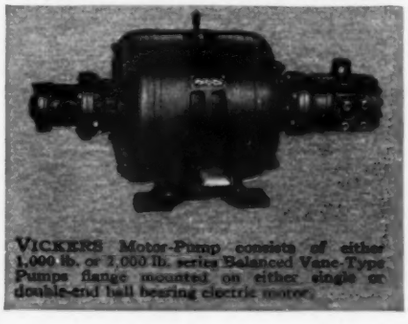


VICKERS Multiple Unit Valves, used extensively for road building and maintenance equipment.

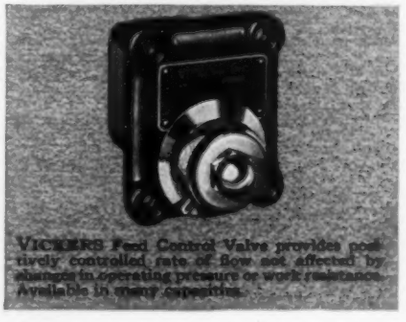
VICKERS Hydraulic Relief Valve (Balanced) for pressures to 3,000 lbs. per sq. in.



VICKERS Hydraulic Variable Speed Transmission used for wide variety of rotary drives.



VICKERS Motor-Pump consists of either 1,000 lb. or 2,000 lb. series Balanced Vane-Type Pumps flange mounted on either single or double-end ball bearing electric motor.



VICKERS Feed Control Valve provides positively controlled rate of flow not affected by changes in operating pressure or work resistance. Available in many capacities.

VICKERS Oil Reservoir and Motor Base includes Balanced Vane-Type Pump and Relief Valve.

Practically any required feeds and sequence of motions (manual, semi- or full automatic) can now be secured by using various arrangements of standard Vickers pumps, valves, control panels, etc. This results in greater flexibility, interchangeable parts and lower costs.

Vickers engineers will be pleased to work with you in the application of efficient and dependable hydraulic feeds and controls to your machine tools and other equipment.

Write for information and bulletins descriptive of above or other items in which you may be interested.

VICKERS *Incorporated* • 1400 OAKMAN BLVD., DETROIT, MICHIGAN

Complete

BRONZE BEARING SERVICE

. . . for all Industry

Regardless of what type sleeve bearing you may require, Johnson can make it. Our complete facilities are geared to meet your demands for any style in any quantity. The uniform high quality of all Johnson products is the result of more than 25 years exclusive bearing experience. Try us on your next requirements.

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Bronze-Back, Babbitt-Lined
Steel-Back, Babbitt-Lined
Flanged, Single or Double
Bronze Sheet Metal
Steel Sheet Metal
Graphited Bronze
Electric Motor Service
Special Bearings
made to blue print specifications

BUSHINGS

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Completely Machined
Johnson UNIVERSAL
Available in over 220 sizes

BABBITT

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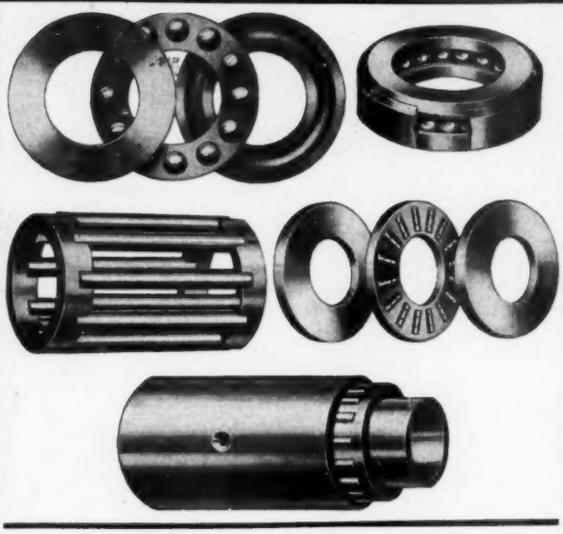
Engineering and Metallurgical advice and assistance—offered without obligation.

JOHNSON BRONZE COMPANY
515 SOUTH MILL STREET NEW CASTLE, PA.

SLEEVE BEARING HEADQUARTERS



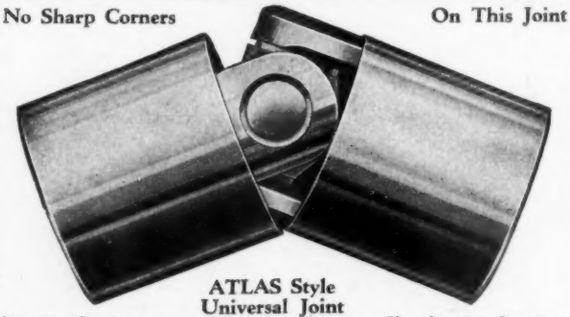
UNFALTERING PERFORMANCE
OVER YEARS HAS EARNED
FOR **BAL-ROL** PRECISION
BEARINGS, WIDE RECOGNITION

LET OUR ENGINEERING DEPARTMENT
HELP YOU WITH YOUR BEARING PROBLEMS

CATALOG NO. 12 SENT ON REQUEST

THE BALL & ROLLER BRG. CO.
22 BENWELL, DANBURY, CONN., U.S.A.

No Sharp Corners On This Joint

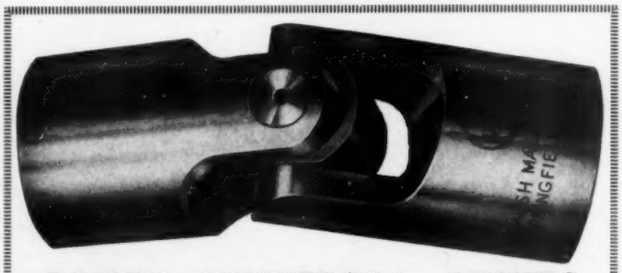


ATLAS Style
Universal Joint

has no edge to scrape and wear other parts. No play nor looseness. Runs easily and accurately. It has great strength and wearing qualities.

Send for circular, describing it fully

The Gray & Prior Machine Co.
69 Suffield St. Hartford, Conn., U. S. A.

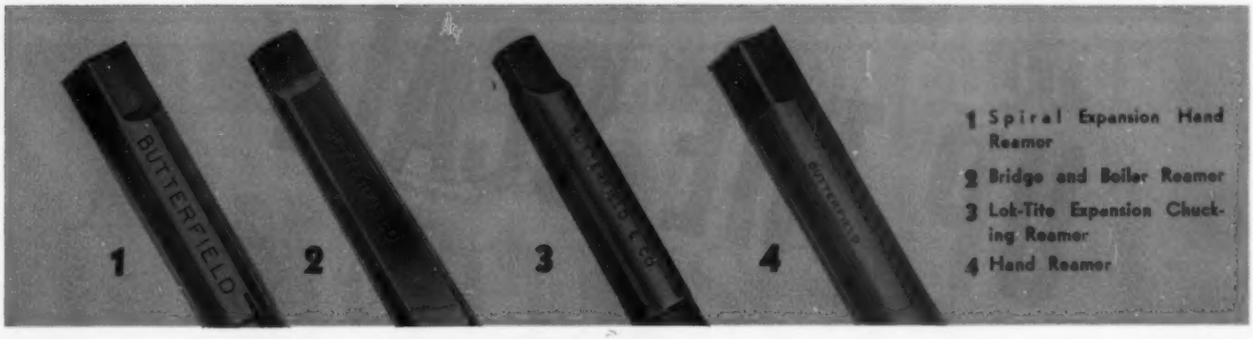


BAUSH UNIVERSAL JOINTS

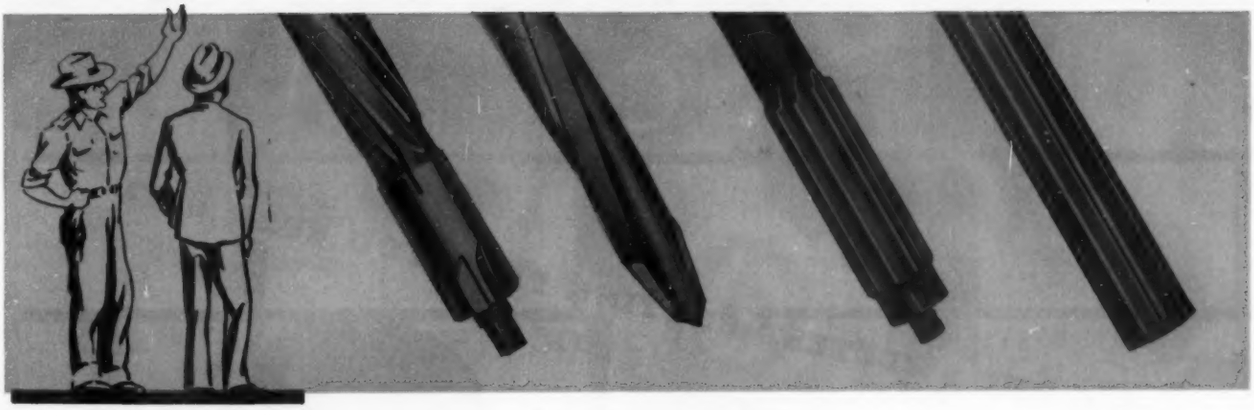
These Universal Joints have been on the market for years, but we have made improvements both in materials used and in construction. Consists of five pieces only and can be easily taken apart and reassembled. From ⅝" to 4" dia., in steel or bronze, or steel with bronze center blocks.

Write today for Descriptive Bulletin and prices.

BAUSH MACHINE TOOL CO. SPRINGFIELD MASS., U. S. A.



BUTTERFIELD



Our Products Include

TAPS
Cut and Ground Thread

REAMERS
Solid and Expansion

DIES
Solid and Adjustable

SCREW PLATES

SPECIAL TOOLS

BUTTERFIELD
THE BETTER TOOLS

. . . . . the best answer to any Reaming Problem!

No matter what your toughest reaming problem may be — whether the emphasis is on high production, fine finish, close tolerance, or all three combined — there's a Butterfield Reamer that will give the best possible results at lowest ultimate expense.

The four popular types of reamers here illustrated are only the beginning of the wide variety illustrated and described in the Butterfield Catalog. And we are always glad to develop special reamers for special requirements.

Correct selection of steel (carbon or high speed) plus scientific heat treating and precision grinding enables Butterfield Reamers to stand up indefinitely under the most exacting production conditions and schedules. Demonstrations in your own shop—on your own work—on request. Just telephone, or drop a line, to the nearest store listed below.

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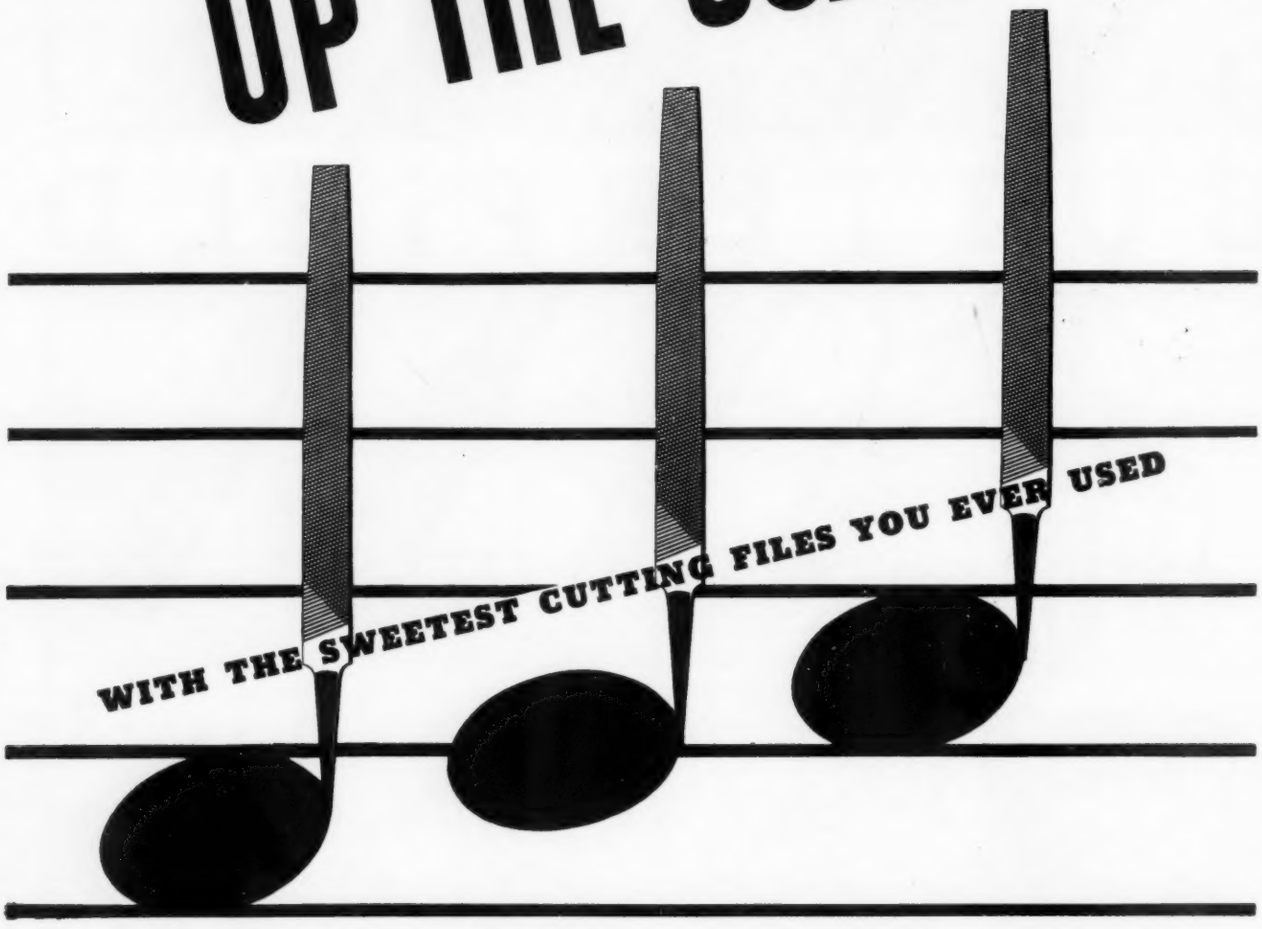
BUTTERFIELD DIVISION
DERBY LINE, VERMONT . . . . . ROCK ISLAND, QUEBEC

STORES: New York, 61 Reade St. Chicago, 11 So. Clinton St. Cleveland, Hal. W. Reynolds, 3346 Superior Ave. Detroit, 6540 Antoine St. Toronto, 49 Main St., Mimico. Montreal, 111 St. Paul St., West. Agents for Great Britain—Charles Churchill & Co., Ltd., 27-34 Walnut Tree Walk, Kennington, London, S. E. 11, England. Branches at Birmingham, Manchester, Glasgow, Newcastle-on-Tyne and Bristol.

UP THE SCALE



OF PRODUCTION EFFICIENCY

With the first stroke on metal the mechanic knows that Nicholson, Black Diamond and McCaffrey Files are "sweet cutting files."

These files start cutting with a minimum of effort. They cut easily and rapidly — stroke after stroke. They stay on the line of work and do not tend to skid off to one side or the other.

Because of their modern tooth construction, Nicholson, Black Diamond and McCaffrey Files are sweet cutting files and fast cutting. In an impartial hand test, one of our new 12" flat bastard files removed.

35% more bronze
25% more cast iron

than ordinary 12" flat bastard files.

Nicholson, Black Diamond and McCaffrey Files are the only ones with the tooth construction that makes this performance possible.

Try the sweetest cutting files you ever used in your plant. At mill supply dealers', hardware wholesalers'. Nicholson File Company, Providence, R. I., U. S. A.

PATENTS PENDING

Made In These Brands

NICHOLSON
BLACK ◇ DIAMOND
McCAFFREY

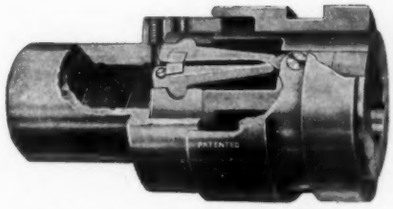
A File For Every Purpose

THE JOHNSON FRICTION CLUTCH

Let

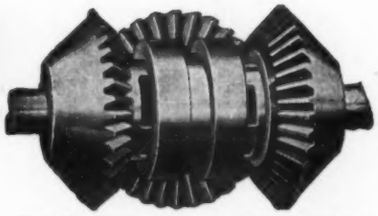
JOHNSON

do it



Single Clutch Showing Working Parts

MODERN GROUP DRIVE PTC



Double Clutch Between Bevel Gearing

The Simplest Way to Solve Your Clutch Problem Is to Turn It Over to Our Engineering Department • •

For over thirty years The Carlyle Johnson Machine Co. has specialized in designing and building Friction Clutches to meet the varied requirements of builders of machinery used in all branches of industry; Machine Tools, Wood-working Machinery, Bottling and Packaging Machines, Machinery for the Textile, Paper, Rubber, Drug and Chemical, Leather, Road-building, Construction Industries, and many others too numerous to list in detail.

Johnson Friction Clutches set the Standard for Line Shaft Installations. Our experience has proved that Johnson ideals of perfection in Friction Clutch Manufacture, have been rewarded by the satisfaction of our users with the efficiency, dependability, and long-wearing qualities of **Johnson Clutches.**

Double Clutch Exterior

During the past five years when manufacturers have been compelled to get all possible utility from their equipment, **Johnson Clutches** which in some cases had been in actual use for 25 years or more, have been reconditioned and returned to their users still good for many years of faithful service.

WRITE FOR "BLUE" CLUTCH CATALOG NO. 14

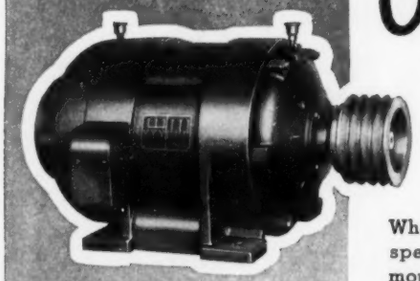
THE CARLYLE JOHNSON MACHINE CO.

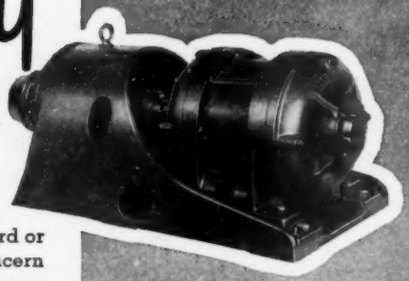
MANCHESTER, CONN.

"SPECIALISTS IN FRICTION CLUTCH DESIGN"

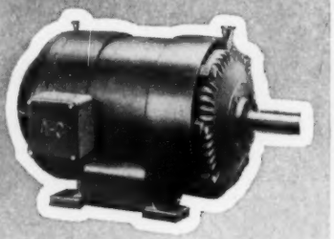
NAME YOUR MOTOR REQUIREMENTS

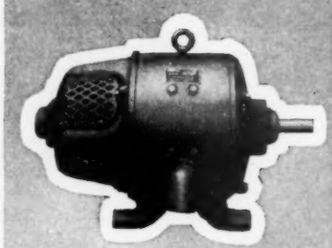
We supply them!

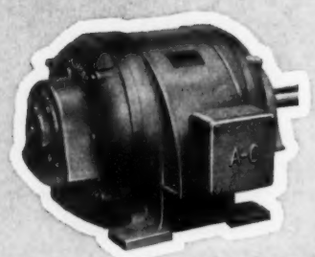


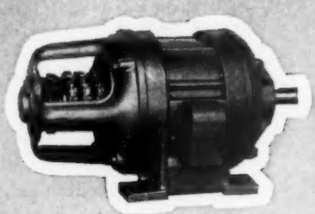


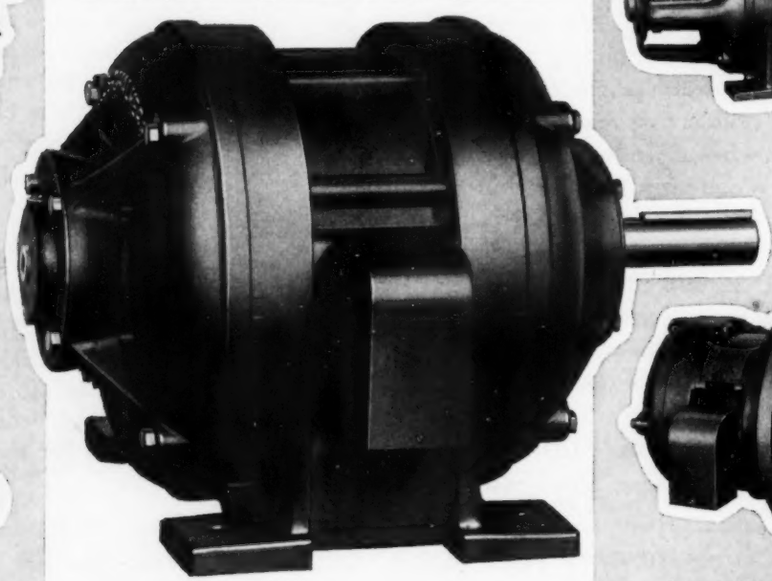
Whether your motor requirements are standard or special, or whether the desired features concern mountings or electrical characteristics makes no difference . . . we supply your motor needs and do so with performance plus. • A small plant in Norwood, Ohio, which became a part of the Allis-Chalmers Mfg. Co. forty years ago, pioneered in the building of standard and special motors. • Allis-Chalmers manufactures the most diversified line of machinery of any company on the American continent. • All the motor knowledge gleaned from pioneering days to the present time and all the experience acquired in producing motors for its own vast line of rugged power driven machinery are the inheritance of Allis-Chalmers Motors today . . . that knowledge, that experience and the guiding principle of quality as an ideal are built into every Allis-Chalmers Motor. They are the sturdiest motors on the market—bar none. Allis-Chalmers manufactures motors of every type, both standard and special, and their district offices, in all principal cities, are ready to assist you in all problems of motor application.

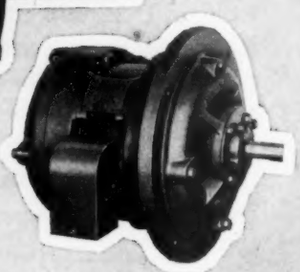










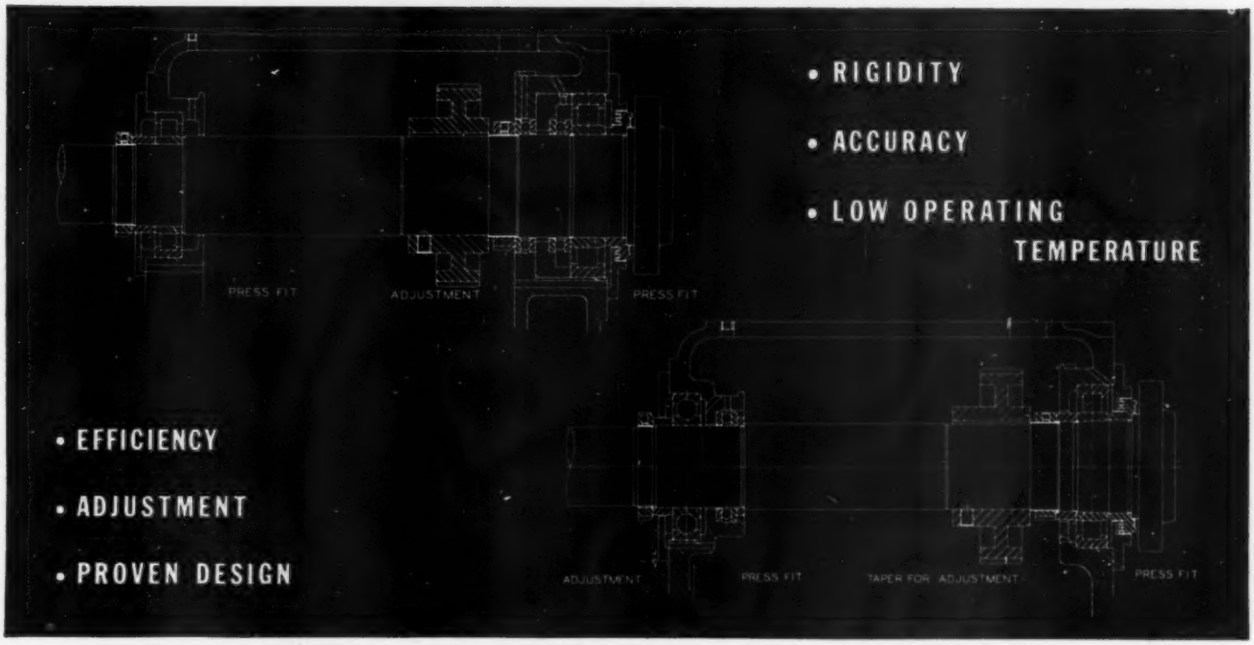


MOTORS

FOR EVERY PURPOSE

ALLIS-CHALMERS MFG. CO. MILWAUKEE, WISCONSIN

SKF .. *for* PERMANENT SPINDLE PRECISION



NEW speeds in production! New standards of hairline precision! New methods of cutting operating costs! The entire machine tool industry is stepping up to new highs by depending more and more upon these practical SKF bearing combinations—dependable mountings that make spindle accuracy *permanent* by giving rigidity, accuracy, low temperature, efficiency and simplicity of adjustment.

RIGIDITY is assured by SKF Cylindrical Roller Bearings that provide long surface contact of rollers. Both inner and outer races are applied with press fit for extreme radial rigidity. The thrust bearings are more rigid axially than any other type of bearings. Neither radial nor thrust bearings require heavy preloading.

ACCURACY is maintained to very close limits because of the inner race concentricity of SKF Cylindrical Roller Bearings. The cylindrical rollers, lapped by a special method, are the most accurate type of rollers that can be produced.

LOW OPERATING TEMPERATURE. Operating accuracy is assured because SKF Cylindrical Roller Bearings cause less heat than any conventional type of bearing. The result of this low friction and that the bearings are not initially loaded, but subjected to work load only, is that the bearings constantly maintain a low operating temperature.

EFFICIENCY resulting from smooth SKF performance with low temperature means high speed and high production. The full capacity of the bearings is available for working loads with long life as the result. Therefore, the design is extremely economical.

ADJUSTMENT is easily obtainable. When this is required radially, SKF Cylindrical Roller Bearings may be driven up on tapered spindles. For *axial* adjustment, tighten the locknut.

PROVEN DESIGNS. Thousands of these precision spindle mountings are in worldwide use today.

Consult our district office or the Home Office for layouts and estimates.

SKF INDUSTRIES, INC.
Front St. & Erie Ave., Philadelphia, Pa.
3744

BALL BEARINGS **SKF** ROLLER BEARINGS

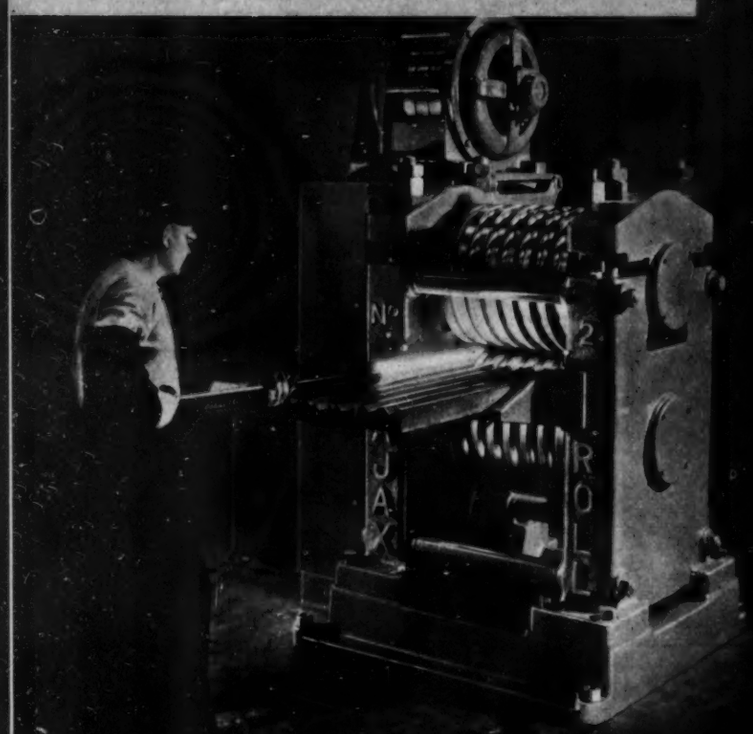
AJAX

FORGING ROLLS and FORGING PRESSES are ideal production combination

A recent advance in the forging field is the use of Ajax "Wide Adjustment" Forging Rolls for rolling minimum weight blanks for subsequent forging in an Ajax "Solid Frame" Forging Press. Substantial economies in manufacture are possible by this method, which utilizes the outstanding advantages of each machine, namely the ability of the rolls to effect rapid displacement of stock and the speed and accuracy of the press for forging.

The stock is first heated and rolled to the required shape with the metal distributed to properly fill the press die impressions. This pre-formed blank can then be forged in the press either at the same heat or after reheating, depending upon the forging, and can be hot coined to extreme accuracy.

The broad possibilities of this method present a most attractive field for future development. We will be glad to make a survey of your forging requirements from samples, blueprints, or by a visit of a qualified engineer to determine whether this method can be applied to advantage in your plant.



Other AJAX Machines

Continuous Motion Rivet Heading Machines

Slow Speed and High Speed Bulldozers

Hot Sawing and Burring Machines

Hot Pressed Nut Machines

Ajax-Hogue Wire Drawers

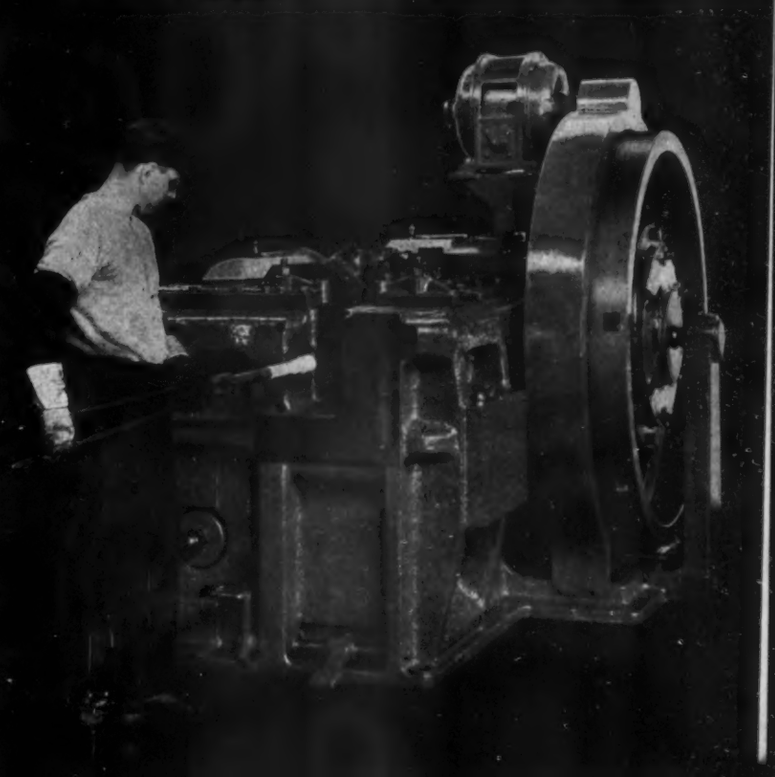
Reclaiming Rolls

AJAX

AIR CLUTCH FORGING MACHINES for high speed, accurate forging

In the period of increased business which lies ahead, the rewards of efficient manufacture will undoubtedly go to those who are prepared to meet the demands of a highly competitive market. Many progressive executives have already modernized their production equipment, replacing obsolete, profit-eating machinery with modern up-to-date machines designed to earn dividends through increased production, higher operating efficiency and improved product.

In the forging field, Ajax Air Clutch Forging Machines are consistently setting new production records on all types of upset forgings and in many cases are producing forgings of difficult shapes to an accuracy formerly believed impossible. These heavier, more powerful, faster machines, ranging in size from 1″ to 7″, are of the most advanced design ever offered to industry. An Ajax engineer will be glad to explain the benefits you can derive by modernizing your plant with these improved machines.



THE AJAX MANUFACTURING COMPANY

EUCLID BRANCH P. O.

CLEVELAND, OHIO

621 MARQUETTE BLDG., CHICAGO, ILL.

201 DEWART BLDG., NEW LONDON, CONN.

IF you are - - - -

working to close tolerances in your manufacturing operations, the use of B & L Flats will enable you to get precision results and to eliminate expensive machining work.

These convenient sections are ready to use "as is." They come *cold drawn* to accurate size and section, commercially smooth surface, and square sharp corners. The extreme range of sizes gives you a choice of practically any dimensions to meet your requirements right from stock.

Due to the popularity of B & L Flats in the steel working industry, the Standard Flats and Extra Wide Flats are carried in stock by local warehouses from coast to coast. Specify them for bed plates, backing for dies, machine mountings and hosts of equipment parts.

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B & L PRODUCTS

SHAFTING
Drawn, Turned, Ground, Polished

SCREW STOCK
Open Hearth and Ultra-Cut Steel

SPECIAL SECTIONS
Extra Wide Flats

ALLOY STEELS

BLISS & LAUGHLIN, INC.
HARVEY, ILL. *Sales Offices in all Principal Cities* BUFFALO, N.Y.

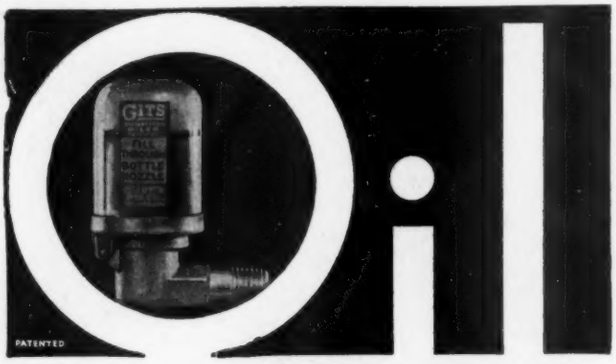
Columbia TOOL STEEL

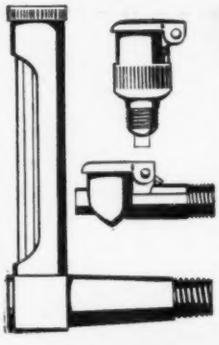
Present-day tool efficiency is dependent on Good Tool Steel.

Columbia tool steels meet the most exacting demands.

It pays to use Good Tool Steel.

COLUMBIA TOOL STEEL COMPANY
MAIN OFFICE AND WORKS
425 E. 14TH STREET, CHICAGO HEIGHTS, ILLINOIS





CUPS

Seven hundred styles and sizes — to fill any industrial requirement — is proof of Gits leadership. The Gits line includes a complete range from regulation oil hole covers to special feature oilers — unbreakable sight wick feed, gravity feed or constant level oilers — oil cans — oil and grease seals and gauges. General catalog includes illustrations and complete information on all styles.

GITS BROS
MANUFACTURING CO.
S. KILBOURN AVE., CHICAGO

Reprinted from
The Modern Hospital

It was the Summer of 1927. To do homage to Charles Lindbergh, a throng of the great and near-great was gathered in the banquet hall of a New York hotel. Toast upon toast, eulogy upon eulogy, were tendered the returned hero—the solo flier who had just conquered the Atlantic.

Almost unnoticed at the speaker's table sat another Charles . . . Charles Lawrance, President of Wright Aeronautical Corp., designer and builder of the Wright Whirlwind motor whose ceaseless beating had carried Lindbergh to Paris in 33 hours.

At length a friend at his side spoke to Lawrance. "Charley," he said, "what are you thinking as you sit here in the midst of this adulation of the man who did the flying? Why is there so little thought of you, who, with your years of work, gave him the motor that made his flight possible?"

Lawrance paused. Then in his succinct way he answered,

"Who ever heard the name of Paul Revere's horse?"

The name of Paul Revere's horse was "DOBBIN"

. . . and he wasn't a blooded Arabian . . . just a plain work horse. Of course he never got the credit he deserved. You can't cut fame up into little pieces and pass it around to everybody who shared in the job. Most of us are only too glad to do our part because it's the way we earn our oats and . . . well, we get a kick out of doing it right.

Perhaps you have a manufacturing problem that involves metallurgical research. Maybe you're creating a new machine, a whole new industry—or a better mouse-trap. In any case, you'll find the Revere Technical Advisory Service only too ready to work its head off in developing just the right copper alloy and helping your plant find the best way to fabricate it. And when the job is done, we won't ask to share the glory. That is one thing we got from Paul Revere's horse.

Revere Copper *and* Brass

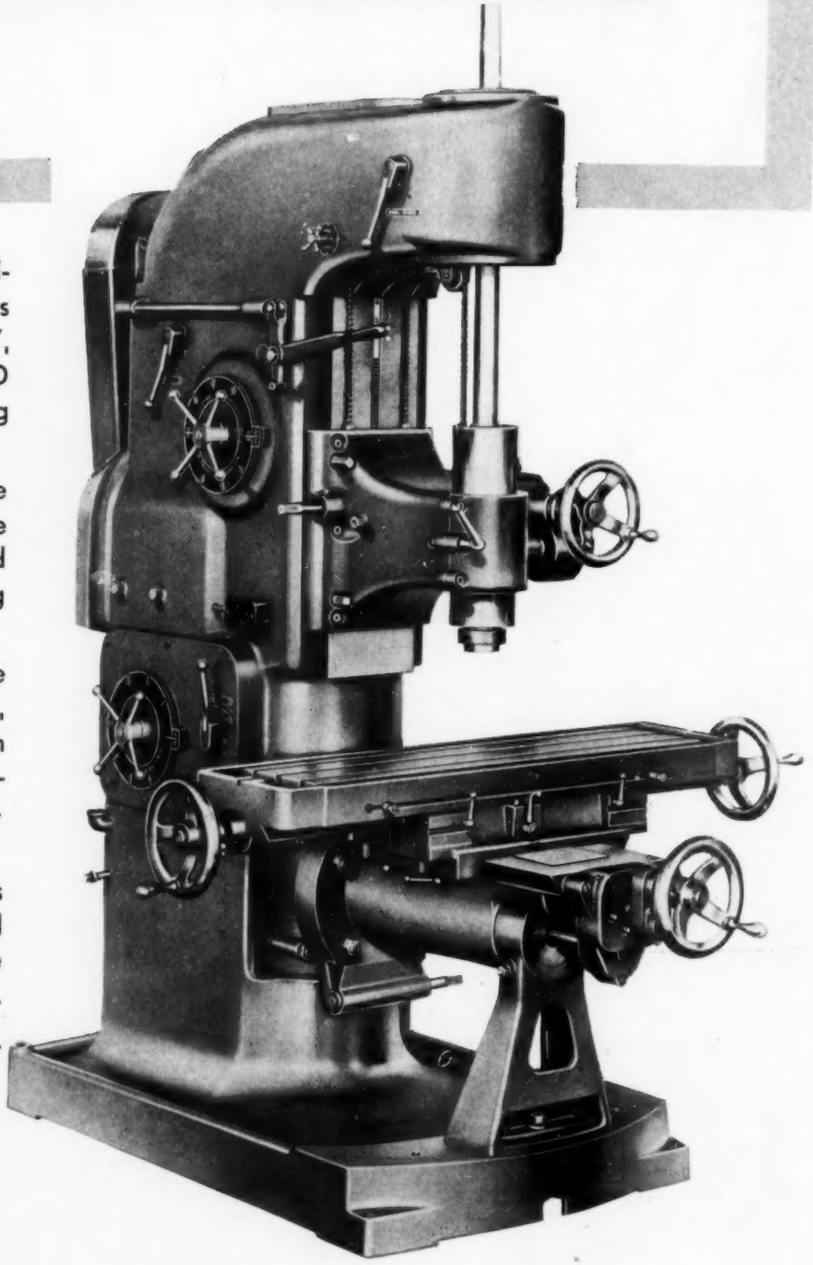
FOUNDED BY PAUL REVERE
1801

INCORPORATED

EXECUTIVE OFFICES: 230 PARK AVENUE, NEW YORK CITY · MILLS: BALTIMORE, MD. · TAUNTON, MASS.
NEW BEDFORD, MASS. · ROME, N. Y. · DETROIT, MICH. · CHICAGO, ILL. · SALES OFFICES IN PRINCIPAL CITIES

It's Here!

The New No. 40 KNIGHT MILLER



Here it is — Industry's latest universal vertical miller in which is combined maximum VERSATILITY, RIGIDITY, ACCURACY and SPEED without sacrifice of operating ECONOMY.

It's *new*! It's *economical*! It's more *efficient*! . . . and it performs a wide range of angular milling, boring and facing operations without resetting the work.

Among its unique features, and one that stamps it as a real profit-maker, is the table unit construction which combines tilting and swiveling — thus effecting many savings and increasing production facilities.

Why not get all the interesting facts about this modern machine? Find out for yourself how it can save you money — increase your profits.

Write for complete details TODAY.

W. B. KNIGHT
MACHINERY CO.
St. Louis Mo.

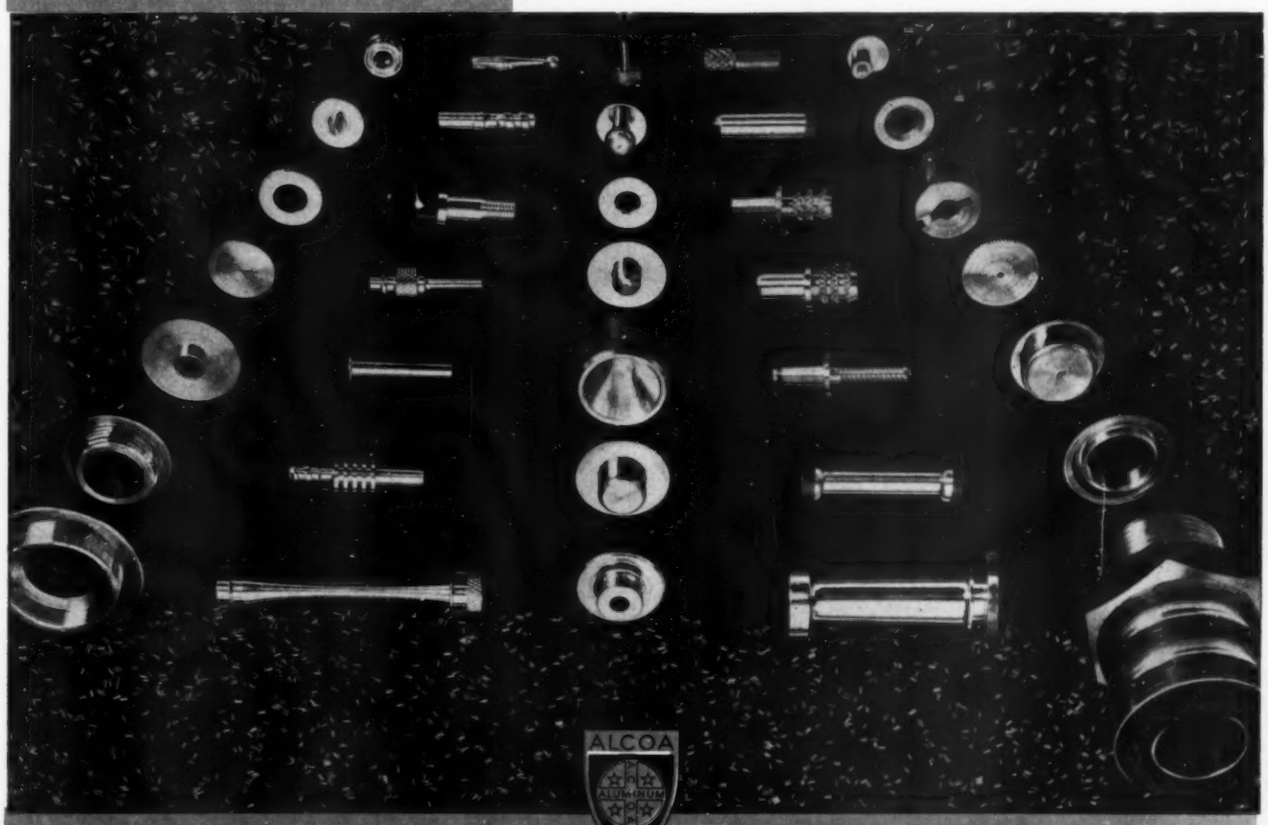
A fundamental: "The Rule of Three" that accounts for low cost on these parts

● Users of the new Alcoa *Free-Cutting* Screw Machine Stock have dubbed it the "Rule of Three."

They mean this: to compare the actual material cost of using Alcoa Free-Cutting Stock, you must divide the price-per-pound by 3, because Alcoa Aluminum weighs only one-third as much, hence gives three times as many parts per pound.

The "Rule of Three" tells you about this advantage, but neither words nor photographs can tell you about the other cost-cutting features of the new Free-Cutting Stock so convincingly as a trial in your own shop will do. Small chips like those shown mean no fouling, high-speed production, bright finish, and long tool life; all show up in practical trial.

For that reason we offer you a free sample. The only obligation is to let us know what success you have. Write today for a sample large enough to try on your machines, so you can see for yourself how you get the lightness, resistance to corrosion, and appearance of Alcoa Aluminum, at an actual saving. ALUMINUM COMPANY OF AMERICA, 2107 Gulf Bldg., Pittsburgh, Pa.



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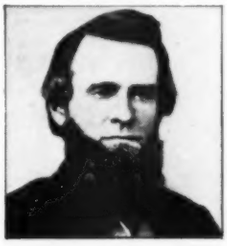

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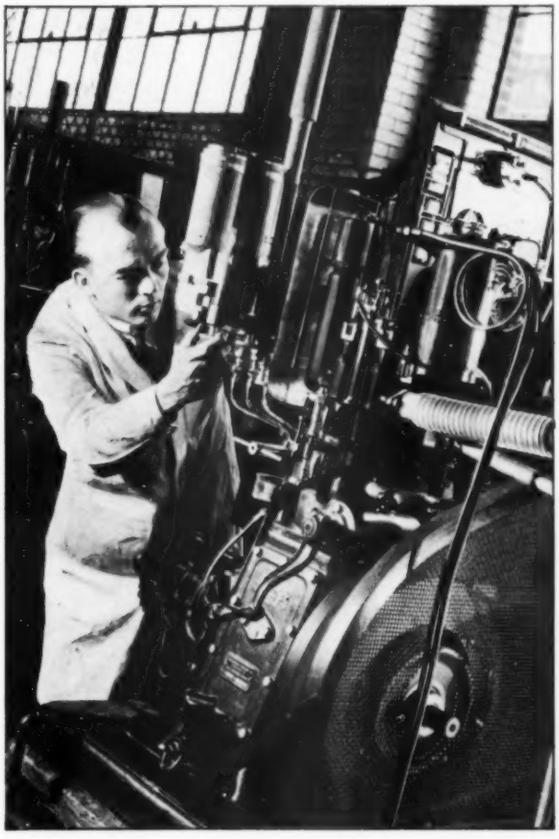
Socony-Vacuum engineers solve some 25,000 individual lubrication problems every year. They help capable plant staffs to curb friction losses and power consumption . . . reduce maintenance expense and repair costs . . . increase machine efficiency and step up production . . . lower oil bills and make better plant lubrication cost less.

It would be a very timely business move to urge your men to seek the cooperation of Socony-Vacuum engineers.

An organized plant lubrication program, based upon individual requirements, will enable them to do better work.



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1. **Curbs friction loss and reduces power consumption.**
2. **Reduces repair, replacement and maintenance expense.**
3. **Steps up machine efficiency for greater production.**
4. **Lowers oil bills to make plant lubrication cost less.**

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SAVES MONEY FOR INDUSTRY

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2. MORE CONTINUOUS PRODUCTION
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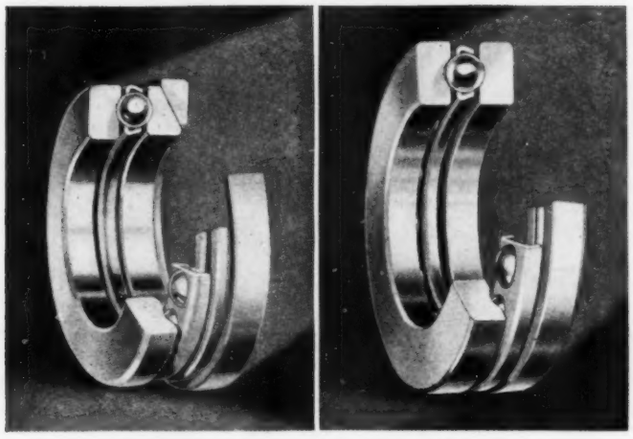

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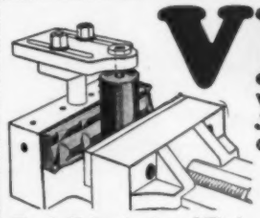

Fig. 3. V-Jaw for Round Work

Attachments mean much drilling — small Jig cost.

Fig. 2 Without Jig Attachments

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Drives Small Drills up to Proper Speed
INCREASE THE SPEED 3 TIMES
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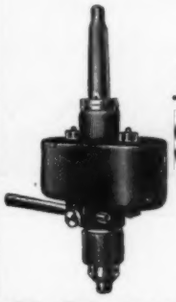

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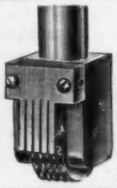

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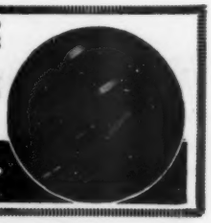

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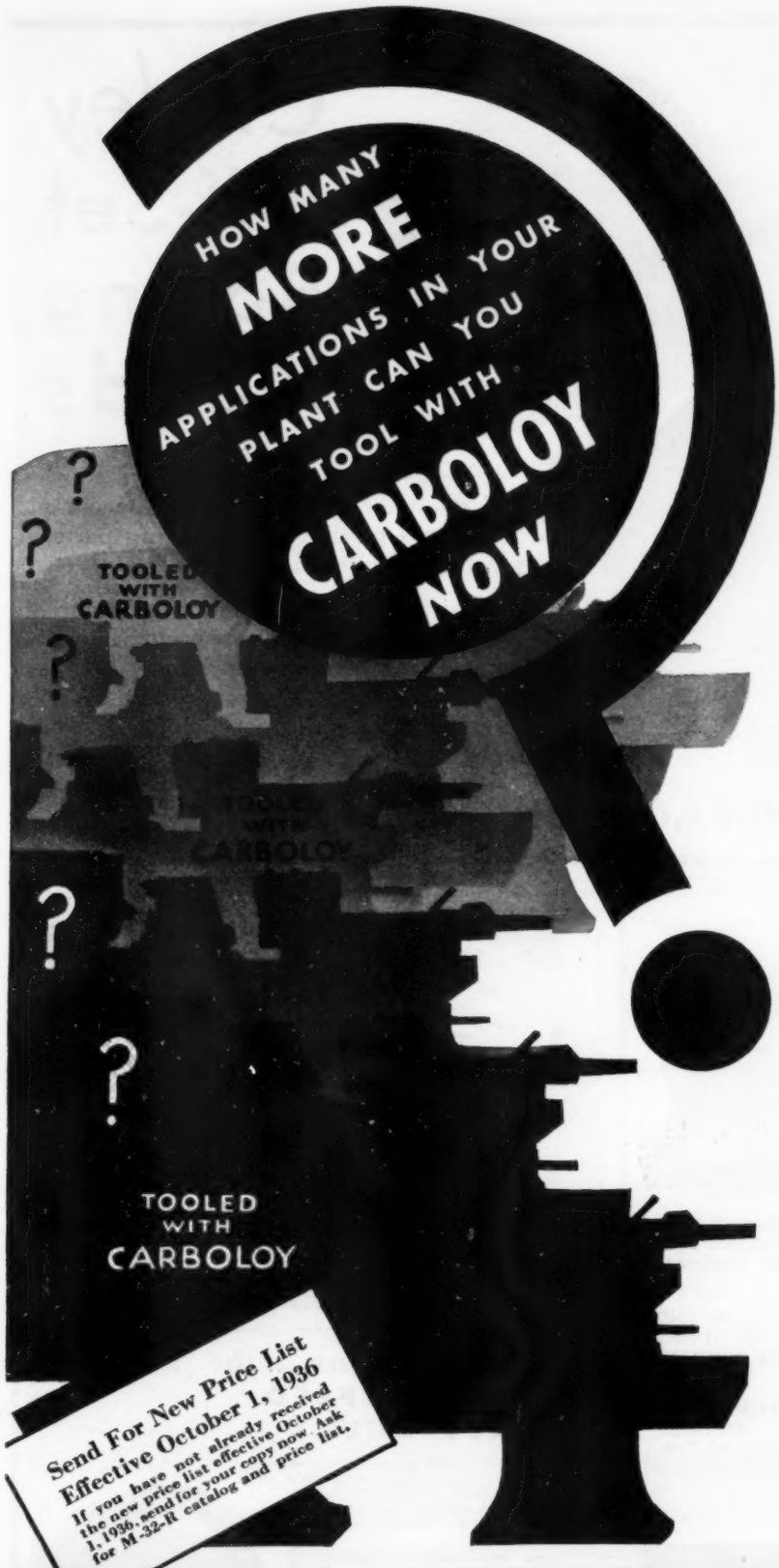
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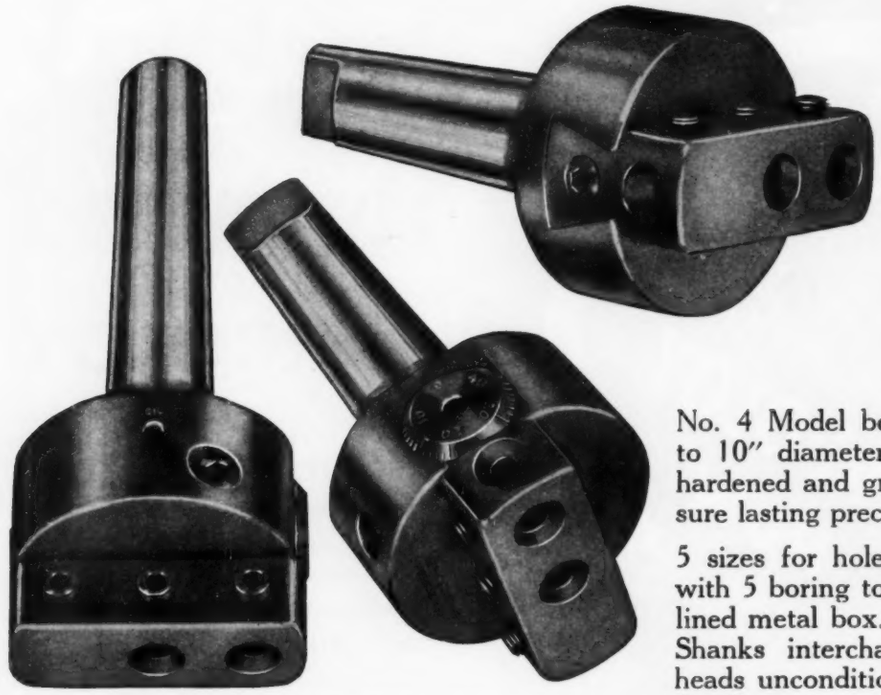

Three views of the No. 4 head for holes 0 to 10" diameter.

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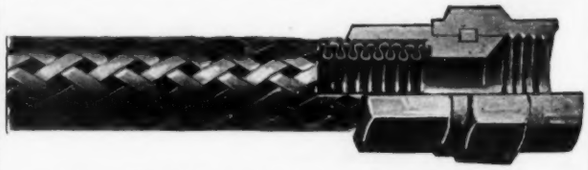

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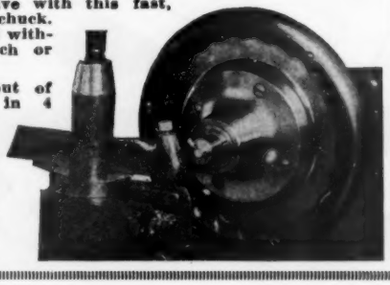

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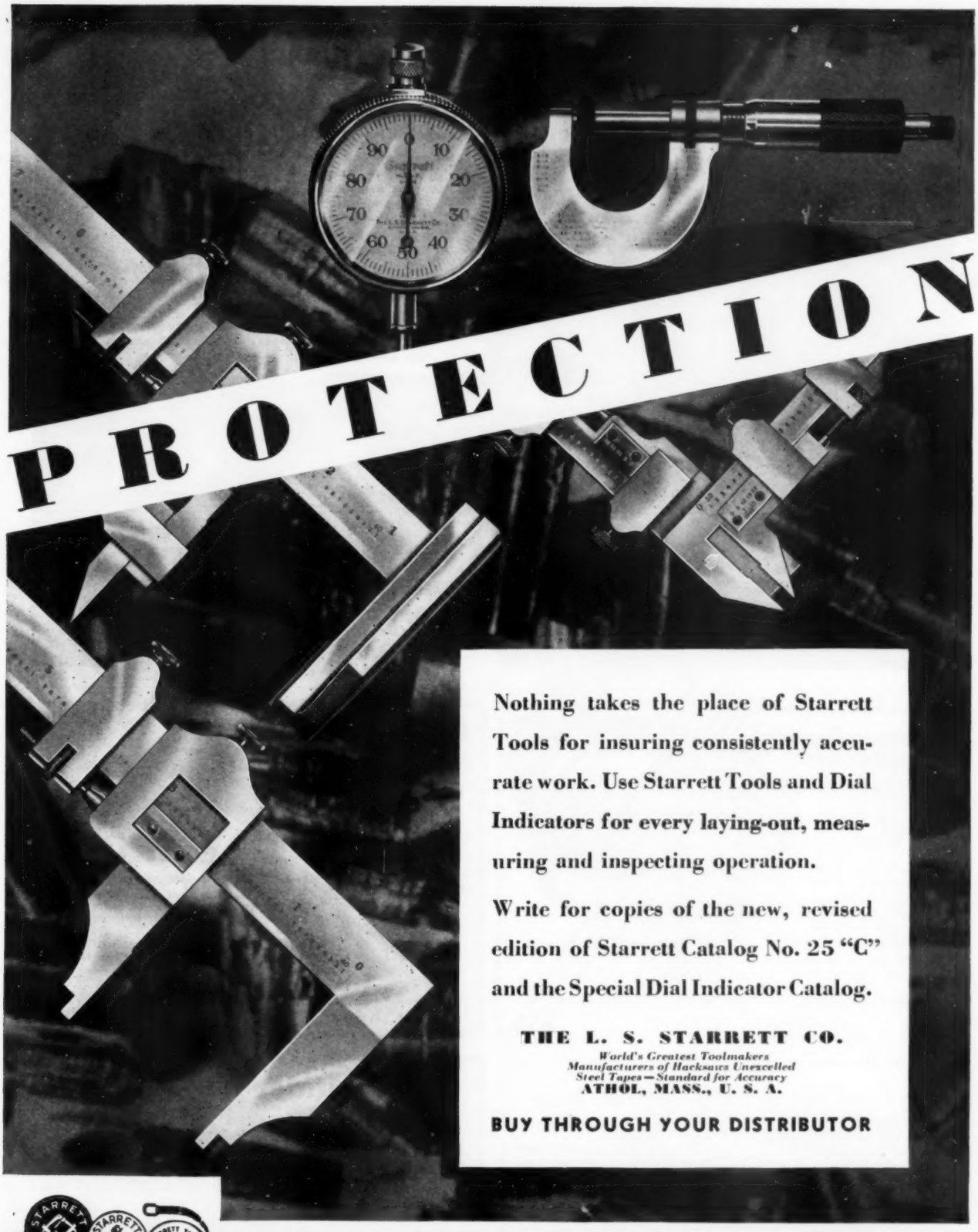

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R & L No. 1 Tool. Diameter shank $\frac{3}{4}$" x 2" long—hole through shank $\frac{7}{16}$" diameter. Turns 0 to $\frac{5}{8}$" diameter x $2\frac{1}{4}$" long.

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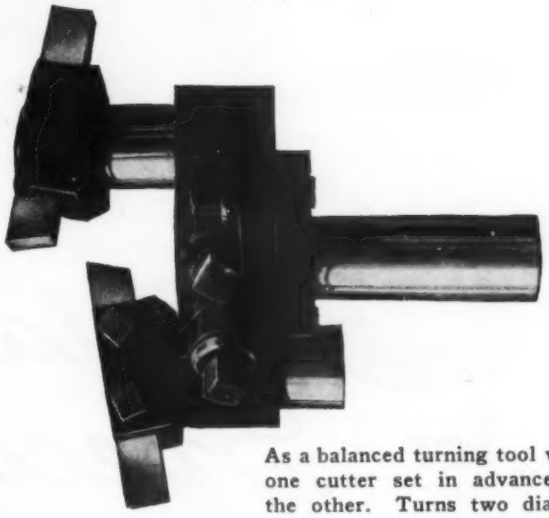
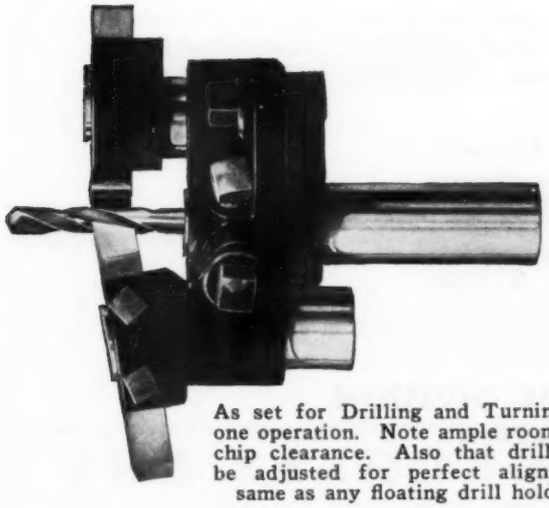
Back Rest and Cutting Tool set for Right Hand Turning



As a balanced turning tool with one cutter set in advance of the other. Turns two diameters if desired



As set for Drilling and Turning at one operation. Note ample room for chip clearance. Also that drill can be adjusted for perfect alignment same as any floating drill holder

Used as a balanced turning tool either right hand or left hand

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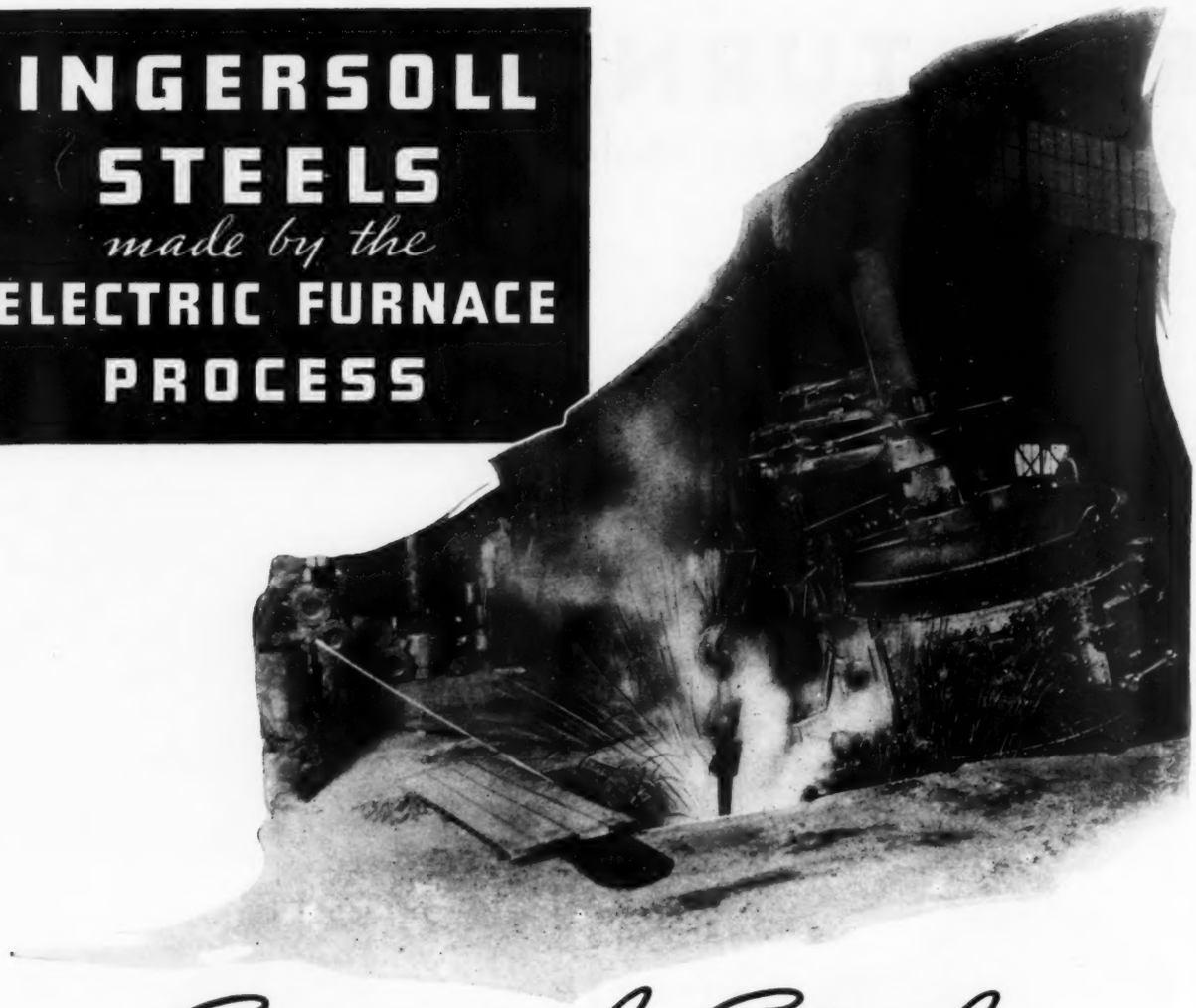

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FOUR FLUTED DRILLS

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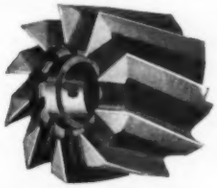

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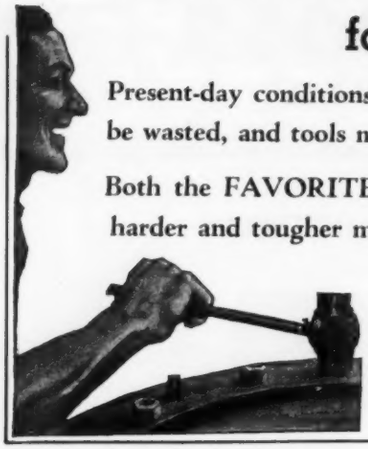
for SPEED and ACCURACY



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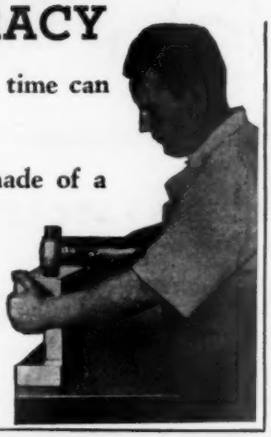
Both the FAVORITE Wrench and BASA Hammer are now made of a harder and tougher metal, insuring long life under hard usage.

There are many operations around the plant where these tools can be utilized to great advantage.



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A quick, straight-ahead motion completes the operation without taking the wrench head off the nut. No danger of slipping.

A TIME-SAVER

REVERSE MOTION INSTANTANEOUS BY SIMPLY TURNING PAWL

There is great satisfaction in possessing up-to-date equipment, and to know that the job can be taken care of efficiently, without using makeshift tools.

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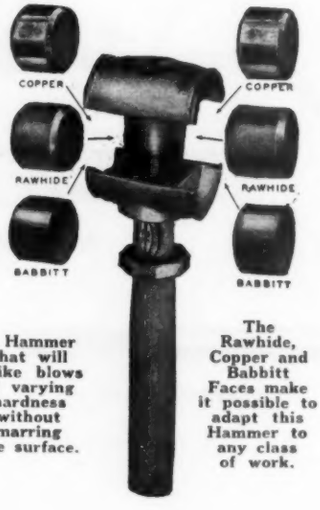
A BLOW WITHOUT A DENT

BASA Hammer

Made in five sizes

Each hammer has the exact weight to give the proper balance for striking a measured blow.



A Hammer that will strike blows of varying hardness without marring the surface.

The Rawhide, Copper and Babbitt Faces make it possible to adapt this Hammer to any class of work.

GREENE, TWEED & CO.

SOLE MANUFACTURERS

109 DUANE ST., NEW YORK, N.Y.

British Representative

W. F. Johnson & Co. (London), Ltd. 14 & 16 Farringdon Road, London, E. C. 1

PRODUCTION THREADING

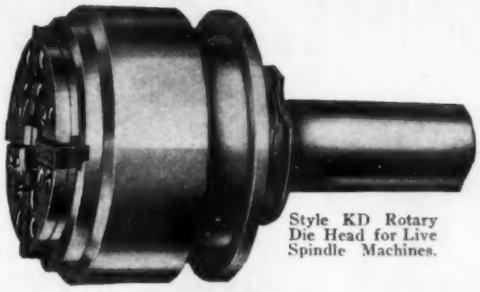
with

GEOMETRIC

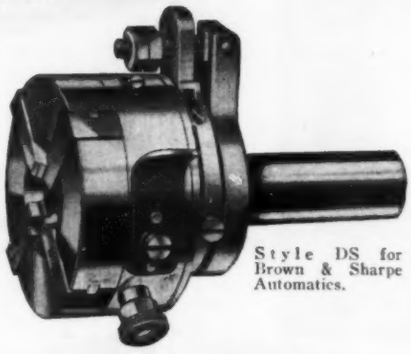
Self Opening Die Heads

and

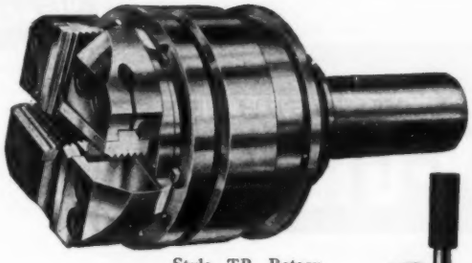
Collapsing Taps



Style KD Rotary Die Head for Live Spindle Machines.

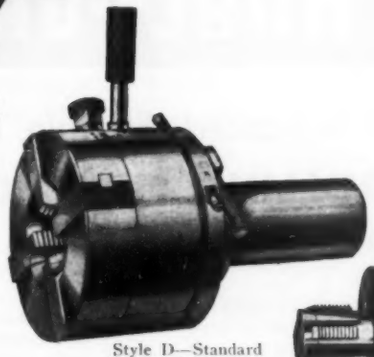


Style DS for Brown & Sharpe Automatics.

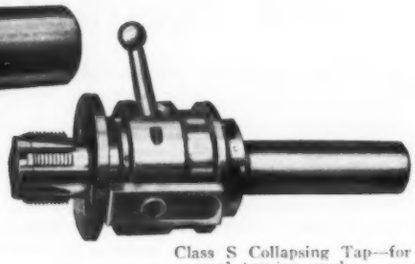


Style TR Rotary with Tangent chasers.

Type No. 12 Single Spindle Threading Machine.



Style D—Standard heavy-duty die head.



Class S Collapsing Tap—for general tapping work.

Your difficult threading jobs are easier and cheaper when automatic threading tools are used. The elimination of backing-off brings higher production, greater accuracy. Size adjustment for wear and grinding provides uniform accuracy on long runs.

But you will want die heads and taps that are simple, compact, and above all—accurate! You will want such features as rigid chaser support, positive action, easy shoulder threading, easy adjustment. You will want chasers made by precision methods, tested and inspected, built of special steels, specially heat treated. You will want Geometric tools—Geometric chasers.

Die heads, taps, chasers, threading machines, grinders, and fixtures—a complete line representing the accumulated knowledge and skill of more than forty years as specialists in threading tools and equipment.

THE GEOMETRIC TOOL CO.

NEW HAVEN, CONN.

BROWN
PRESENTS

FURNACE ATMOSPHERE ANALY-GRAPH

The Most Advanced, Flexible, Positive Method

FOR CONTROLLING FURNACE ATMOSPHERE

Brown Analy-Graph brings to the metal working industry a radically new and practical method for controlling furnace atmospheres.

It continuously records the quality of furnace atmosphere during heat treatment of metals—whether Scaling or Descaling—Carburizing or Decarburizing.

Whether combustion is complete or incomplete—Brown Analy-Graph furnishes a continuous record of "measured furnace atmospheres", enabling operators to minimize or eliminate entirely, scaling or decarburizing. Thus, faulty heat treatments, rejects, and expensive refinishing are easily avoided.

Brown Analy-Graph operates on the Thermal Conductivity principle and measures furnace atmospheres with the same precision with which the potentiometer measures temperature. It gives unfailing response to variations in air supply and humidity conditions.

Brown Analy-Graph not only measures—but it enables you to check the exact amount of oxidation and reduction in your furnace atmosphere—for any metal—at any temperature. Likewise, the correct atmosphere for all types of metals can be duplicated again and again—for lot after lot. Guesswork is eliminated.

Brown Analy-Graph is universally applicable to any type furnace wherein furnace atmospheres are controllable. It works in conjunction with—or without—automatic temperature control. It is easily installed on your present furnaces, large or small—electric or fuel fired.

Years of research have been spent in developing this latest Brown engineering achievement. In actual plant operation. Brown Analy-Graph has been acclaimed by leading metallurgists as a revolutionary development for controlling furnace atmospheres. Brown Analy-Graph is simple in operation, rugged and easy to install.

Our engineers will be glad to discuss your problems of furnace atmosphere control. Learn more about the outstanding advantages of Brown Analy-Graph. Write THE BROWN INSTRUMENT COMPANY, *a division of Minneapolis-Honeywell Regulator Co.*, 4501 Wayne Avenue, Philadelphia, Pa. Offices in all principal cities. Canadian factory: 117 Peter Street, Toronto. European address: N.V.N. Minneapolis-Honeywell Co., Wydesteeg 4, Amsterdam-C, Holland.

BROWN DIVISION INDUSTRIAL INSTRUMENTS

BROWN FURNACE ATMOSPHERE RECORDER

To Measure and Control is to Economize

. . ALL BATH TAPS

ARE GROUND FROM THE SOLID AFTER HARDENING

. . . . guaranteeing uniform hardness—uniform maximum accuracy . . . . extremely long life.

Better and faster work at lower tapping costs are definitely assured to users of BATH TAPS.

By hardening in the solid, BATH is in position to Rockwell the tap on the outside diameter and in the section where the teeth are ground. Thus a perfectly hardened grain structure is assured at the point where cutting is actually accomplished as well as where the taps do not actually cut. Delicate thread edges cannot possibly be burned or become brittle and warped as they frequently are where hardening is done after teeth are cut.

In addition, BATH offers finer finished teeth, highly polished flutes, and lapped centers. When desired, BATH TAPS can be NITRIDED for super hardness. The extreme accuracy and long service between grinds are available in BATH TAPS at no extra cost.

A BATH engineer will gladly help you put your tapping operations on a more profitable basis.

STEPS IN THE BATH PROCESS

1. Blanks of high speed steel (bar stock)
2. Centered
3. Squares are milled
4. Flutes are milled
5. Stamping (sizes on shank)
6. HARDENED
7. O.D. of tap and shank diameter ground on centers to insure concentricity
8. Pointing (chamfer) ground on
9. Flutes ground and proper hook given for material tap is to be used on
10. Flutes polished by a special machine method which eliminates tendency of chips to get into grinding marks and which presents a smooth surface for chips to curl and clear free from the tap.
11. THREADS GROUND OUT OF THE SOLID
12. Taps are NITRIDED — if desired — a process which gives a super-hard surface and removes grinding nap. (No additional charge for NITRIDING).

BATH PLUG THREAD GAGES

1. Made of High Speed Steel—Ground from the solid after hardening.
2. Gages are nitrided, more than doubling wear life.
3. Patented chip cleaner—positively prevents chips and dirt from interfering with check of size—a *proven* factor in reducing size rejections.
4. *Guaranteed to outwear any carbon steel gage; yet, Bath gages cost no more.*

JOHN BATH & COMPANY

Worcester Mass.

Murchey

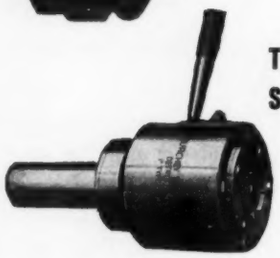
offers a complete line of

DIE HEADS AND TAPS

TYPE "CO" (Rotating) Self-Opening Die Head

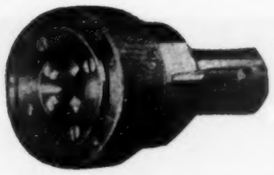
For live spindles. Assure accurate thread length and positive opening. All parts hardened and ground.

TYPE "G" (non-rotating) Self-Opening Die Head



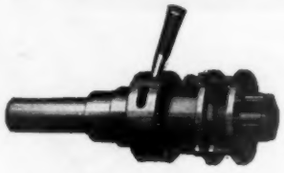
Pull-off type, Chasers interchangeable with TYPE "CO" Rotating Head. All parts hardened and ground.

TYPE "A" (non-rotating) and "C" (rotating) Self-Opening Die Heads



Primarily designed for pipe threading. Designed with receding principle and pull-off trip. Simple and rugged for heavy duty service.

MURCHEY Type "C" Collapsible Machine Tap



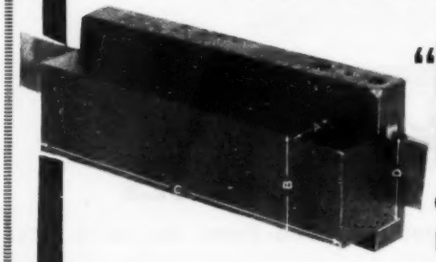
May be used rotating or non-rotating (by removing handle) for machine and pipe tapping. Chasers easily removed. Positive collapse of chaser. Parts hardened and ground.

MURCHEY also offers special collapsible taps, solid adjustable hand sizing taps and a complete line of threading and pipe cutting-off machines, and chaser grinders. Write for detailed information.

MURCHEY MACHINE & TOOL COMPANY
DETROIT MICHIGAN

STOP WASTE

replace expensive forged tools with the



"FOUR GRIP"
CUTOFF BLADE HOLDER

For use with turret lathes equipped with a four-way turret on the cross-slide.

Other types for Lathes, Planers, Shapers, Vertical Boring Mills—Facing and thread cutting blade holder.

Descriptive circulars on request

FOUR-GRIP TOOL COMPANY
107-EAST 17th St. Paterson, N. J.

TWIST DRILLS, REAMERS, HOBS, MILLING CUTTERS, SPECIAL TOOLS

NATIONAL TWIST DRILL & TOOL CO.
Detroit, U. S. A.
Tap & Die Division—WINTER BROS. CO., WRENTHAM, MASS.

LUCAS "PRECISION"

Horizontal Boring, Drilling and Milling Machine

THE LUCAS MACHINE TOOL CO.

NOW AND ALWAYS OF

CLEVELAND, OHIO, U. S. A.

LELAND-GIFFORD COMPANY WORCESTER MASS. U.S.A. MACHINE TOOLS OF MANY TYPES

Drilling and Tapping Machines
(Automatic and Semi-Automatic)

LELAND GIFFORD CO.
WORCESTER, MASS.

EACH SAYS IT IN HIS OWN WAY

"LOWER PRODUCTION COSTS"

"LONGER TIME BETWEEN RESHARPENING"

"BETTER WORK"

"FASTER CUTTING"

but THEY ALL AGREE...

THERE IS A DIFFERENCE

The executive sees it in lower production costs. The tool room foreman in longer time between resharpening. The shop men themselves in better work — in faster cutting.

If you are of the opinion that there is no difference in metal-removing tools, try Morse Tools your own way in your own shop. It will pay you to prove "There Is A Difference."

NOTE ON THE MORSE TAPER SHANK:

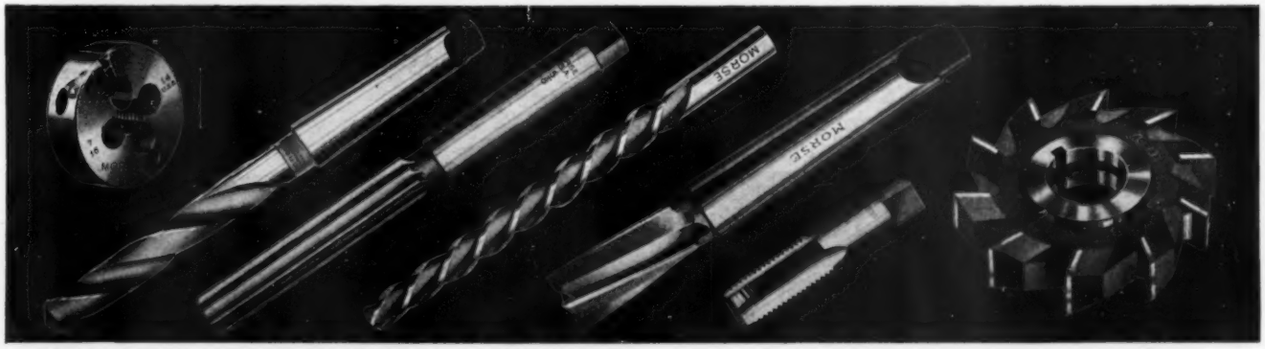
It should be clearly understood that "Morse Taper Shank" is a general term and may apply to the product of any manufacturer. It does not necessarily indicate a genuine Morse product. Specify *Genuine Morse* Tools.

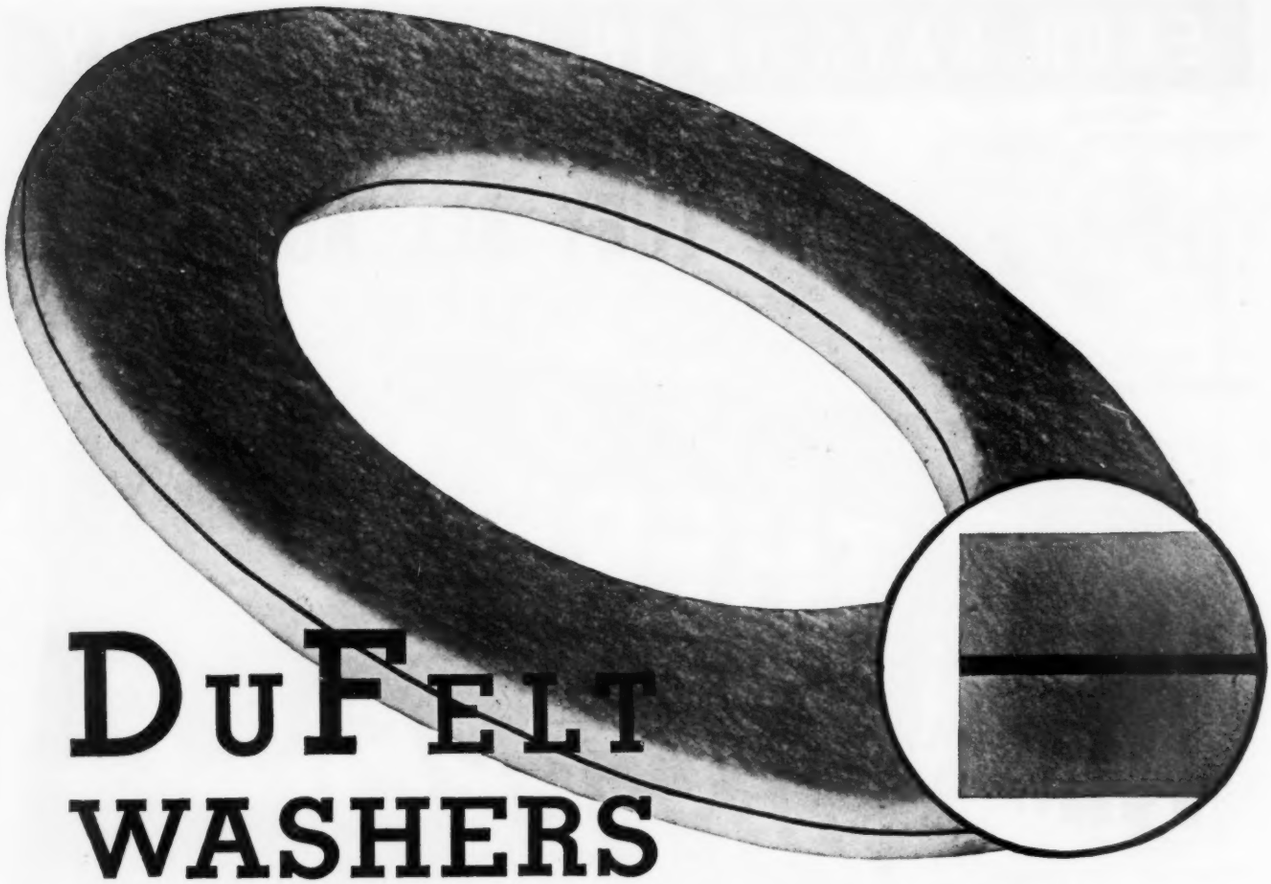
A Conveniently Located Morse Distributor Will Give You Prompt Service.

MORSE

TWIST DRILL & MACHINE COMPANY
NEW BEDFORD, MASSACHUSETTS, U. S. A.

THE MORSE LINE INCLUDES HIGH SPEED AND CARBON DRILLS - REAMERS - CUTTERS - TAPS and DIES - SCREW PLATES - ARBORS - CHUCKS - COUNTERBORES - MANDRELS - TAPER PINS - SOCKETS - SLEEVES





DuFelt WASHERS

(PATENTED)

STOP OIL!

The best grit-excluding washer is a felt washer.

The best *lubricant-retaining barrier is †Neoprene.

DuFelt washers combine layers of felt and Neoprene, giving two-fold

protection, doing the job better, for a longer time and at less cost. Adaptable to every need without extensive redesigning, occupies small space, wide range of speeds, minimum friction, easy assembly, efficient under heavy duty conditions — such as auto and truck ‡axles.

Write for samples and details.

* — Light or heavy petroleum grease or oil.

† — DuPont synthetic rubber, formerly called Duprene.

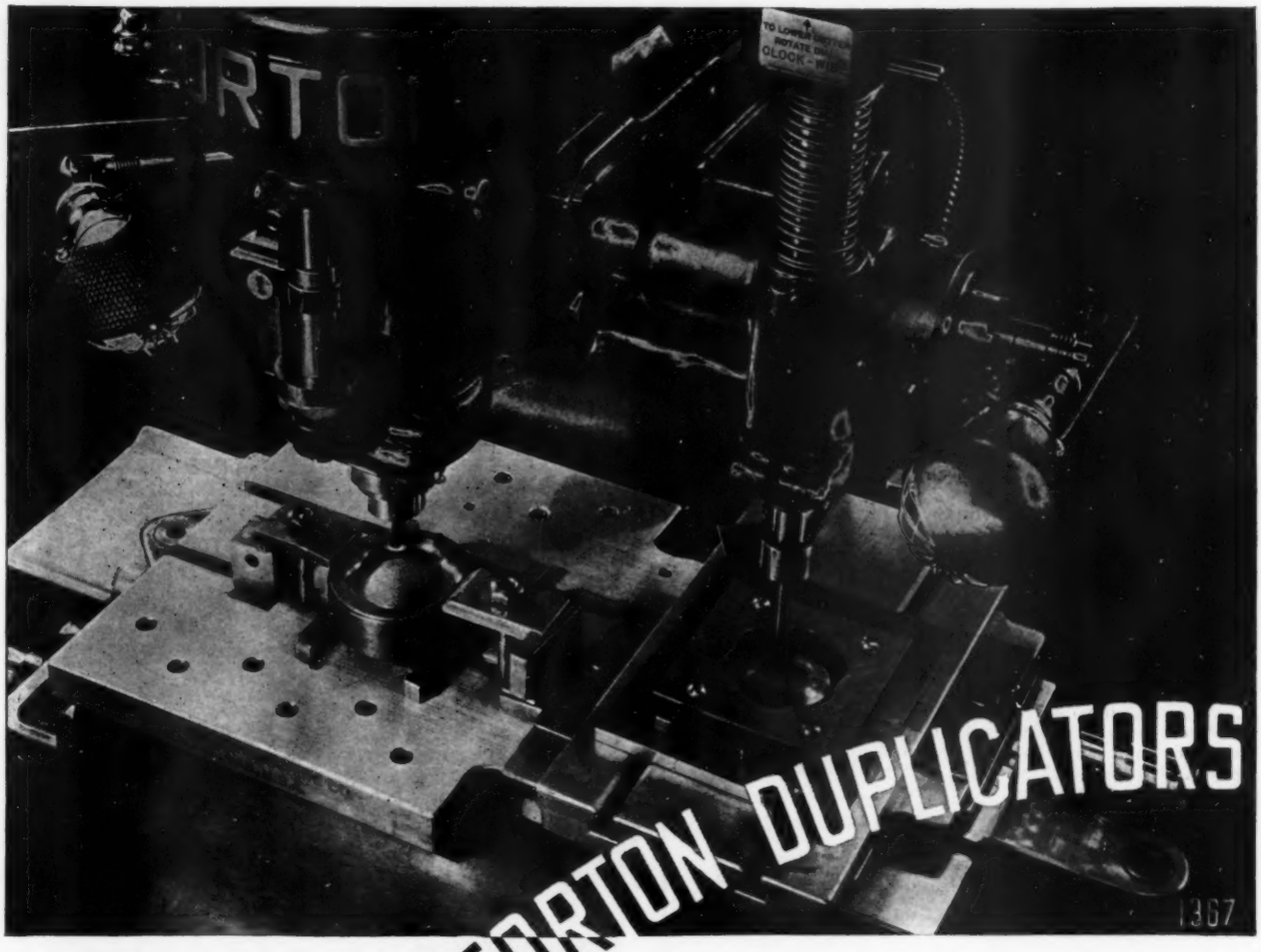
‡ — Now used by a leading auto manufacturer after extensive service tests.

THE FELTERS CO., INC. DEPT. A.M. 210 SOUTH ST., BOSTON, MASS.

Manufacturers of Felt and Felt Products

MILLS AT MILLBURY, MASS., JOHNSON CITY, N. Y. AND JACKSON, MICHIGAN

Sales Offices at New York · Philadelphia · Cleveland · Detroit · St. Louis · Chicago · Los Angeles · San Francisco · Dallas



EXAMPLE No. 1367 — Bottom plate for glass mold. Formerly routed out by hand on milling machine in 30 minutes. Produced within .002" of size with 8½D Duplicator in 7 minutes in chilled cast iron with one roughing cut. The illustrations show plate just as it left Duplicator and plate and master set up on Duplicator. This master design is recommended for small lots or temporary use. The flat brass template limits the lateral movement of the tracer, and the curved plate beneath guides the vertical movement. Many combinations can thus be obtained.

You don't need skilled die makers

If your problem is production of small dies and molds for plastics, glass, rubber, die castings, drop forgings, etc. you can stop scouring the country for tool makers. You will be a lot better off both now and in the future to install a Gorton Duplicator and make use of the semi-skilled mechanics that you can more readily lay hands on.

The cost of Gorton Duplicators is low as duplicators run. They are simple to operate and you can train in a day any reasonably intelligent mechanic to produce accurate work. Faster too than the skilled die maker by ordinary methods.

Look over the job shown here. A Gorton Duplicator (view looking down on work table showing milling cutter spindle on the work at left and tracer point on the master at right) is reproducing the bottom plate for a glass bottle mold.

This is one of the simpler jobs. Watch our ads for some of the more complicated jobs done just as easily. Send for descriptive bulletins and names of manufacturers who have been using Gorton Duplicators for one to three years.

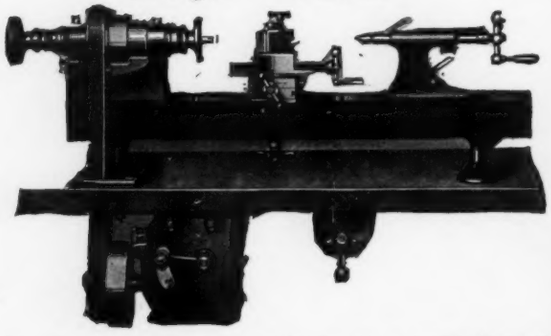
GEORGE GORTON MACHINE CO.
1103 13TH ST., RACINE, WIS.

"Stark"

master tools since 1862

NEW SERIES B MOTOR DRIVE UNIT

Silent • Vibrationless
Oil-tight • Reliable



Now furnished with 3 step drive pulley, 9 speeds forward and reverse with single speed commercial motor. No jack-shaft or multiple belts. Fits any bench machine or any bench. Benches, highest grade, furnished if desired. The original and best under-bench drive.

Stark Precision Bench Lathes • 6 Sizes

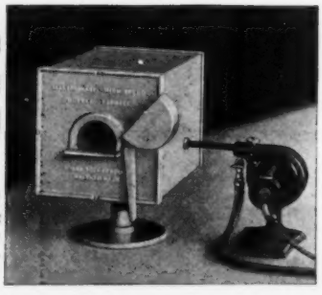
Lever Chuck Closers and Spring-Bind Heads for fast and extremely accurate manufacturing; Automatic Turret Heads; 3-bearing Heads; 5 Spindle Diamond Drills; Sensitive Upright Drills, Collets, Chucks.

STARK Precision Spiral and Plain Bench Millers

The most accurate of their type. Index Centers are the closest of any in this small size.

"ELECTROBLAST" High Speed Muffle Furnace and Portable Torch $70

Torch only, $35



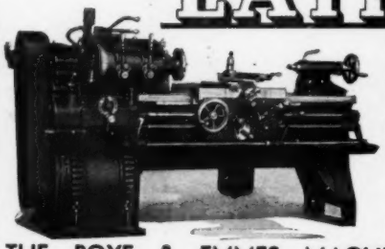
High speed heat in 20 minutes. Operates for 7c per hour. No scaling or decarburizing; quickly saves its cost.

Also a larger size furnace.

STARK TOOL CO. **Est. 1862** **Waltham, Mass.**

Originators of the American Bench Lathe

BOYE & EMMES LATHES



For Heavy Production Jobs or Fine Precision Work.

Versatile, simple to operate, ample power, rigid and accurate. Forty years making lathes—and lathes only—has enabled us to provide you with one of the finest lathes available—and at a surprisingly low cost.

SIZES 14 to 36"

Send for bulletin No. 38

THE BOYE & EMMES MACHINE TOOL CO.
CINCINNATI, OHIO

PJ FOR OVER A QUARTER OF A CENTURY PJ

THE PIONEER MANUFACTURER OF

AUTOMATIC CHUCKING EQUIPMENT

POTTER & JOHNSTON MACHINE CO.
PAWTUCKET, R. I., U. S. A.

THE CLINCHOR

Feeds and sets Clinch Nuts automatically

Answering the demands for automatic feeding and setting equipment for clinch nuts. Single foot treadle control, increases production from three to five times. Standard machines are for the D type Clinch Nuts 9/16" outside diameter. Standard throat depth is 8", larger to order.

May we send you our Bulletin describing these Machines?

THE TOMKINS-JOHNSON CO.
615 N. Mechanic Street, Jackson, Michigan

European Office—Gaston E. Marbaix, Ltd., Vincent House, Vincent Square, London S.W. 1, England.

LATHES { TOOL ROOM / PRODUCTION

Special Machinery • Founders

The
SPRINGFIELD MACHINE TOOL COMPANY
Springfield, Ohio, U. S. A.

GOSS and DE LEEUW

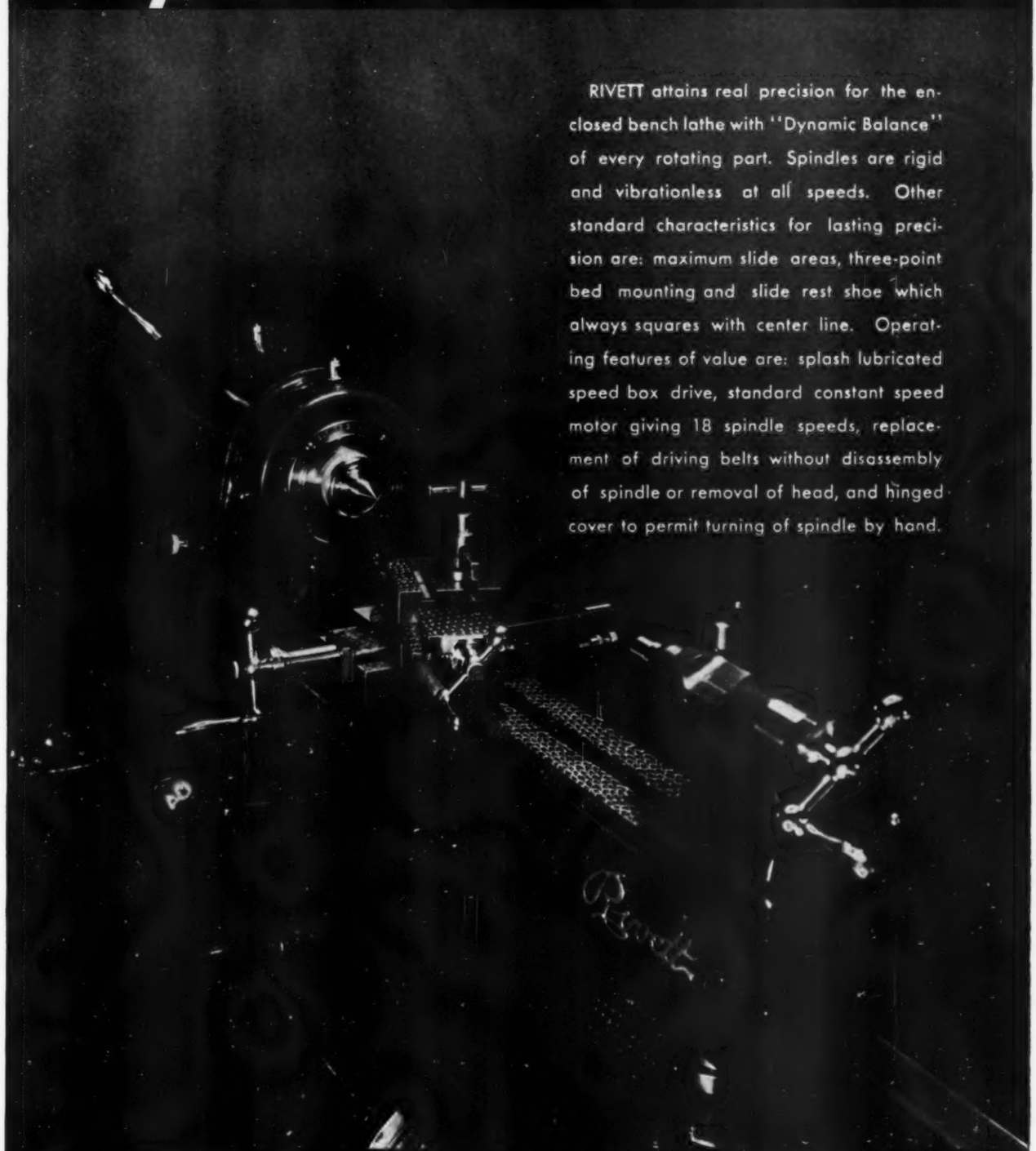
MULTIPLE SPINDLE

CHUCKING MACHINES

Two, Four, Five Spindles • Work and Tool Rotating Types

GOSS & DE LEEUW MACHINE CO., NEW BRITAIN, CONN.

Dynamic Balance



RIVETT attains real precision for the enclosed bench lathe with "Dynamic Balance" of every rotating part. Spindles are rigid and vibrationless at all speeds. Other standard characteristics for lasting precision are: maximum slide areas, three-point bed mounting and slide rest shoe which always squares with center line. Operating features of value are: splash lubricated speed box drive, standard constant speed motor giving 18 spindle speeds, replacement of driving belts without disassembly of spindle or removal of head, and hinged cover to permit turning of spindle by hand.

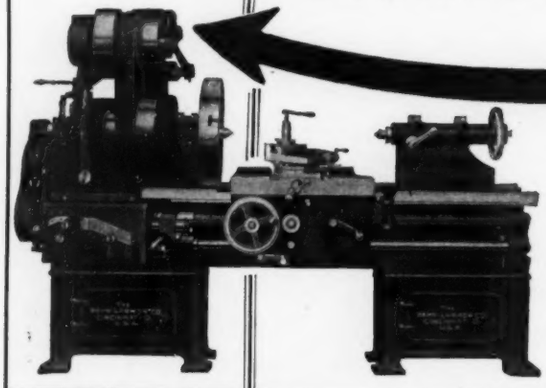
RIVETT LATHE & GRINDER INC.
BRIGHTON, BOSTON, MASS.
PIONEERS IN BENCH LATHE DEVELOPMENT

ADVANTAGES

Easily Installed
Increased Efficiency
Instant Control
Smooth operation
Long Wearing

The Cullman... Lathe Drive

This individual Electric Motor Unit was designed by Cullman to eliminate the old-fashioned countershaft overhead belting arrangement formerly used to drive Cone Pulley Machines.



The Cullman Lathe Drive will increase the efficiency of your shop. Original cost is low, and it is long wearing. Operation is easy and safe, and control is instantaneous. Any lathe, shaper, milling, or screw machine now being driven by overhead belting can be modernized by the installation of a Cullman Drive.

MADE IN SIZES FOR MOTORS RANGING FROM ½ to 7½ H.P.

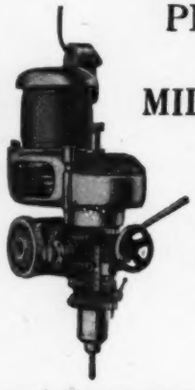
60 DAYS' FREE TRIAL

•

Write for particulars TODAY

CULLMAN WHEEL CO.

1349 ALTGELD ST. CHICAGO, ILL.

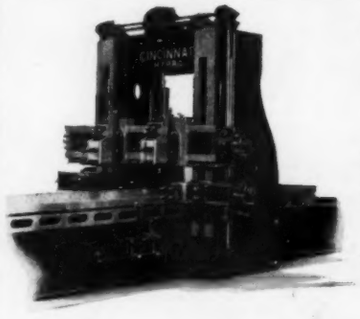


PRECISION BUILT *High Speed* MILLING ATTACHMENTS

The versatility, productive capacity and economy of Bridgeport High Speed Milling Attachments enable them to pay for themselves in a very short time. In use in both small and large plants throughout the United States and Canada. An investment you will be glad you made. Adapters available for all types of machines.

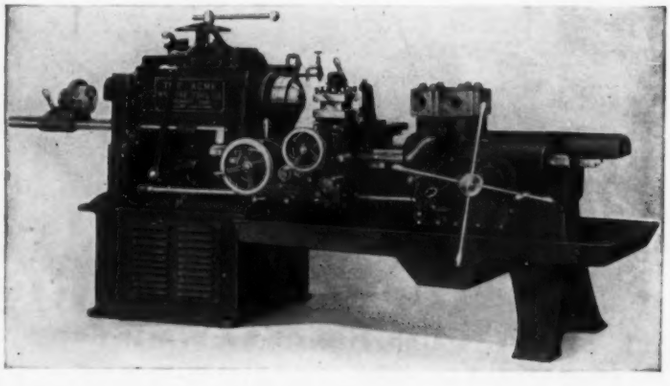
Write for complete details and prices.

BRIDGEPORT PATTERN & MODEL WORKS
52 Remer Street, Bridgeport, Conn.



Planers
Double Housing Openside
Crank Planers
Planer Type Millers
Vertical Boring Mills

THE CINCINNATI PLANER CO.
CINCINNATI, OHIO



CINCINNATI ACME *Way Type* UNIVERSAL TURRET LATHE

A powerful rigid machine for a wide range of accurate bar and chuck work.

Write for details or send blue prints of your work.

THE ACME MACHINE TOOL CO.
Cincinnati, Ohio

INSIDE FACTS

This booklet

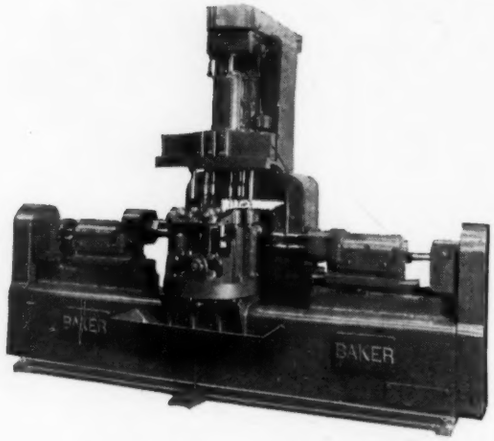
tells the inside facts about a line of high production automatic screw machines that are setting new production records in a wide field. If you want to make money, you will want these facts. If you want the facts you are welcome to the book. Write us for a copy today.

CONE AUTOMATIC MACHINE CO.

WINDSOR, VERMONT, U.S.A.

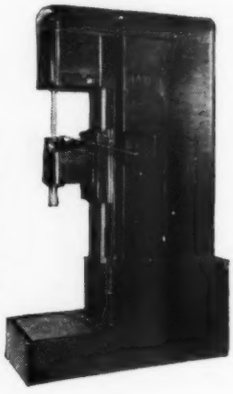
A CATALOG PAGE OF "PROFIT BUILDERS" BY BAKER

★ The machines shown below are some of the recent developments by Baker Brothers, Inc., which are speeding up production and lowering costs in leading plants today.



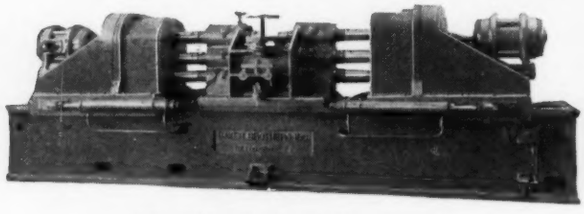
10 HO Hydraulic Feed Drilling Machines

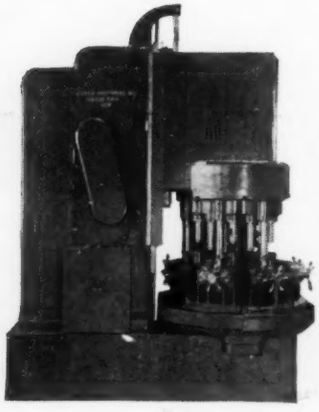
Smallest of three sizes in this design in which all working parts including motors are fully enclosed but readily accessible for adjustments. Available in single or multiple spindle types, with plain or indexing table.



2 CU Cam Feed Units

An adaptation of Baker units for a four-way tapping operation. These units can be mounted in any desired arrangement or combination. Being self-contained, the units can be salvaged and used in different arrangement.





75 HO Hydraulic Feed Drilling Machines

A standard machine equipped with twelve spindles, and a four station, automatic indexing table. Furnished for drilling, boring and reaming crank and pin holes in connecting rods. Each fixture designed for holding two rods.

25 EH Hydraulic Feed

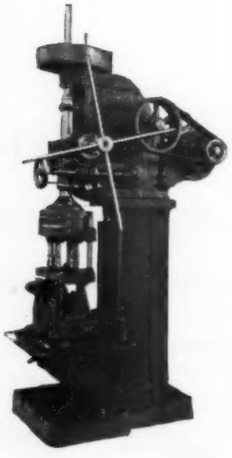
Two-way boring application for tractor transmission case. The machine can be furnished with different length bed, and any desired combination of spindles in each head. Each head is fed by our unique double cylinder construction.

No. 3 Contour Grinder

Especially designed for grinding and polishing dies, cams and irregular shapes. While revolving, the spindle automatically reciprocates vertically, insuring long wheel life and uniform wear. Table can be tilted for grinding angles.

217 Gear Feed Drilling Machine

One of nine sizes of standard heavy duty drills. This machine is equipped with multiplehead for drilling steering gear housing.



Present your problems in drilling, boring or tapping to

BAKER BROTHERS, Inc.

TOLEDO, OHIO

Station Type Machines HOLEUNIT Construction

• Illustrated above are two NATCO station type machines built of NATCO HOLEUNITS. The machine at the left is performing a total of 42 drilling, countersinking, rough boring and facing, rough and finish reaming and milling operations on 120 cylinder blocks per hour. Eighty-four operations are performed with each cycle of the machine . . . forty-two operations on each of two blocks every 60 seconds.

• The machine shown at the right is performing 14 drilling, countersinking and tapping operations on each of two blocks . . . a total of twenty-eight operations every 60 seconds and a production rate of 120 blocks per hour is being maintained.

• These machines, two in a "line" of four such machines being used by this motor manufacturer, are built of steel columns and bases. Each machine is provided with a six position automatic indexing table. The first machine is arranged with 7 NATCO HOLEUNITS (5 vertical and 2 horizontal) and the second machine is arranged with four NATCO HOLEUNITS (all mounted in a vertical position).

• It is true these machines were engineered for specific multiple operation jobs . . . yet they are built of HOLEUNITS which are flexible and interchangeable. They are standard in every respect . . . and may be altered and rearranged as required with a minimum of expense.

• NATCO HOLEUNITS are built in a variety of sizes and capacities. Investigate them today. Call, wire or write for a NATCO representative.

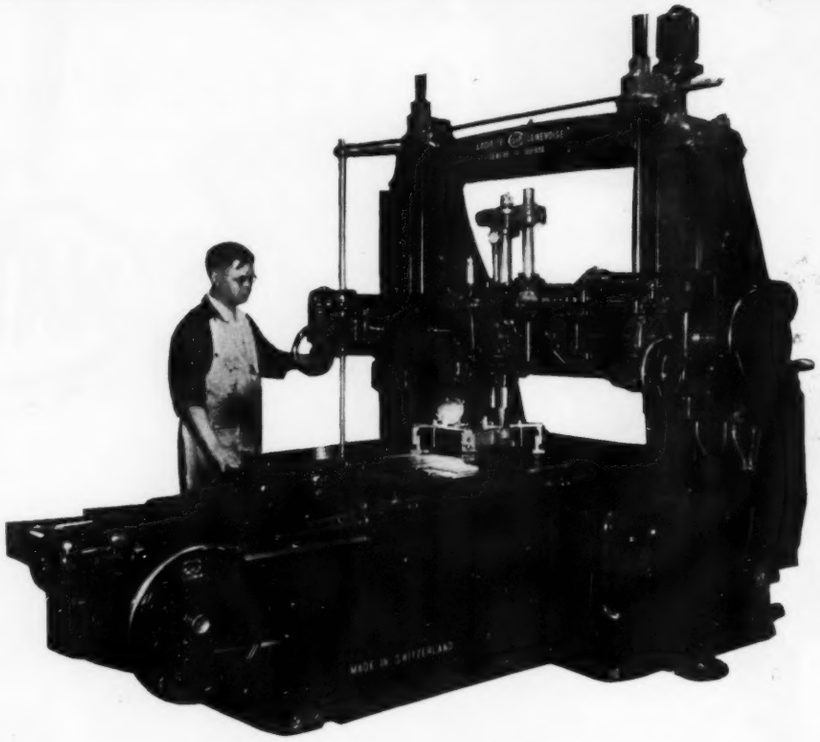
Chicago Office, 2009 Engineering Bldg.
Detroit Office, 409 New Center Bldg.

THE NATIONAL AUTOMATIC TOOL COMPANY
Richmond, Indiana, U.S.A.

Reduce Production Costs! Investigate Today

NATCO

Drilling, Boring and Tapping Machines



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FASTEST

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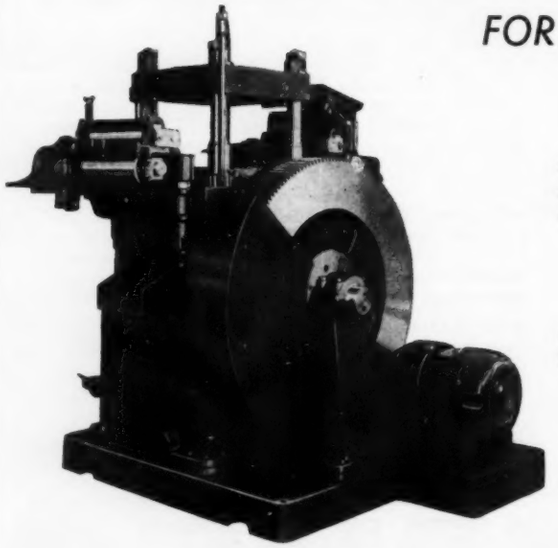
MADE IN 7 SIZES
Send for Free Catalog

AMERICAN AGENTS

TRIPLEX MACHINE TOOL CORP. 125 Barclay Street **NEW YORK CITY**

HENRY & WRIGHT

FOR HIGH PRODUCTION



50-TON DIEING MACHINE

DIEING MACHINES

For automatic production of precision stampings at high speeds with maximum die life. Completed parts at each stroke with low overall operating cost.

AUTOMATIC STEEL PRESSES

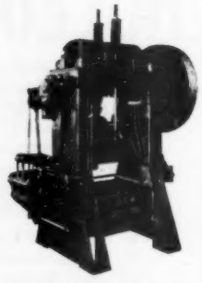
For automatic stamping work where production requirements do not necessitate the Dieing Machine.

SENSITIVE DRILLING MACHINES

For precision high speed drilling requirements.

•

Let us send you catalogs or send us your parts for production estimate.



100-TON AUTOMATIC STEEL PRESS

•

CLASS R DRILLING MACHINE

THE HENRY & WRIGHT MANUFACTURING COMPANY

HARTFORD, CONNECTICUT

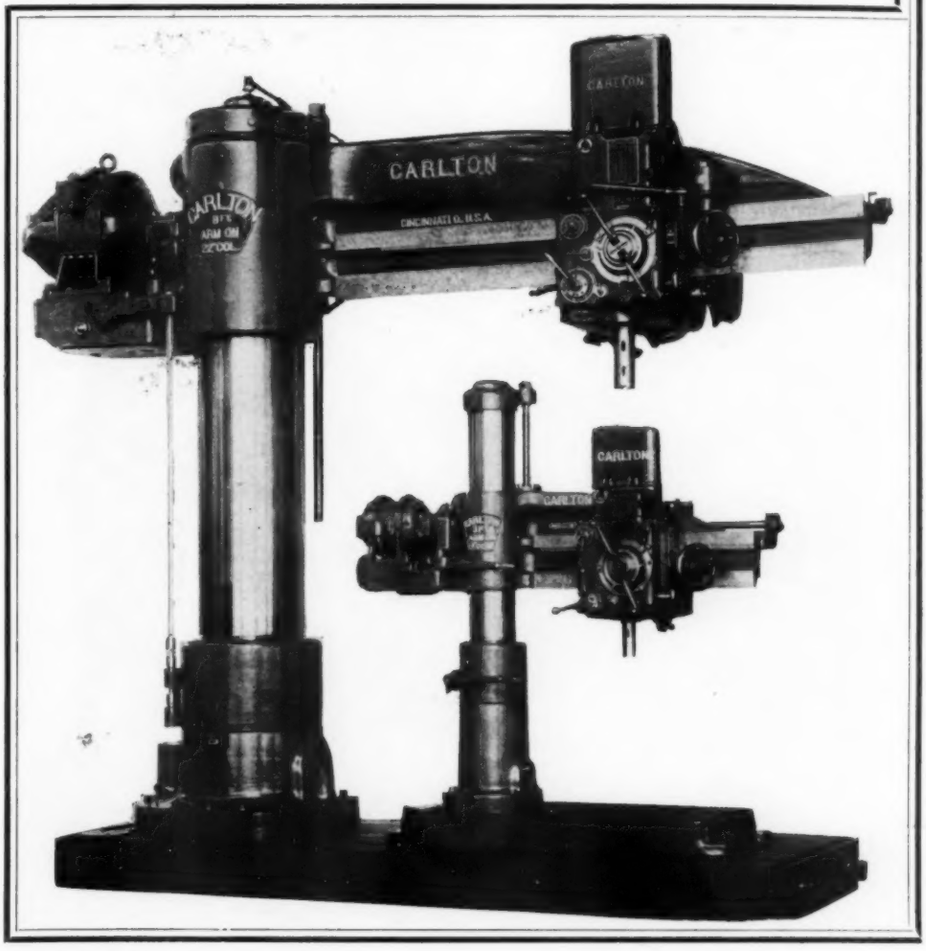
CARLTON
All Ball-Bearing
RADIALS

CHECK the features in the adjoining column and you will understand how this line of Carlton Radials assumes high production through reduced friction, wear, power losses, shutdowns and renewals. They are powerful, quiet, smooth running machines—the result of more than 17 years of specialization.

Sizes: 3′ to 12′ length of arm.

Column Diameters: 9″, 11″, 13″, 15″, 17″, 19″, 22″ and 26″.

The Carlton Machine Tool Company
Cincinnati, Ohio



FEATURES

CONSTRUCTION:

The Carlton Radial Drill is designed, assembled and tested in units and every part is absolutely interchangeable. Each unit has its own oil gauge which can be seen at a glance to assure proper lubrication at all times.

All gears are made of special alloy steel, heat treated and hardened. They have ground teeth and run in oil tight, dust-proof housings. All shafts have integral keys hobbed from the solid and all parts fitting on same are broached with Multiple broaches. These parts are supported on each end by accurately tested anti-friction bearings automatically lubricated.

HEAD:

The Carlton Radial Drill Head is of the Low Hung Drive type, carrying the drive down underneath the arm, driving off the largest diameter of the spindle, closest to the work and cutting tool. This design has given perfect satisfaction since the year of 1920. All parts are made from the best material known to engineers of the present day.

ELEVATOR:

One directionally operated lever placed in a convenient position on the head is used to clamp, unclamp, raise and lower the arm on the column.

A safety kick-out is provided when the arm travels to its extreme limit up or down. An additional safety is provided should any part of the arm meet an obstruction when being lowered.

ELECTRO HYDRAULIC COLUMN CLAMP:

This clamp is an independent self-contained unit mounted under the back of the arm in a protected position and is totally at rest after the lock or unlock cycle is performed. A push button controlled from the head operates this unit and is absolutely guaranteed to lock or unlock the column in a fraction of a second.

POWER RAPID TRAVERSE:

This is an individual unit for traveling the head along the arm and is operated by a small electric motor, controlled from the head by a push button.

An absolutely fool proof safety kick-out is provided for limiting the maximum head travel on the arm and for preventing head travel while the head is clamped to the arm.

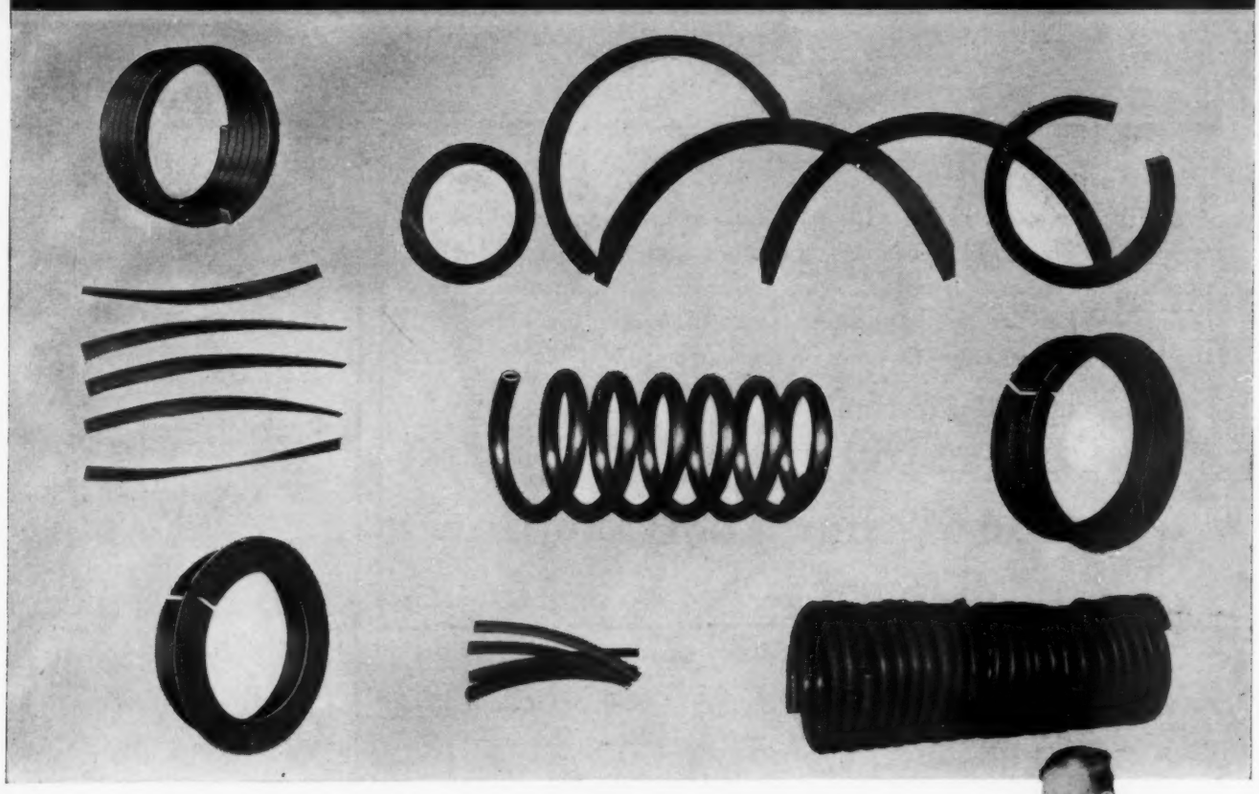
DRIVES:

Carlton Radial Drills can be furnished with either constant speed or adjustable speed motor drive on arm. All electrical equipment is wired to conform to all specifications of the National Electrical Code.

EXTRAS:

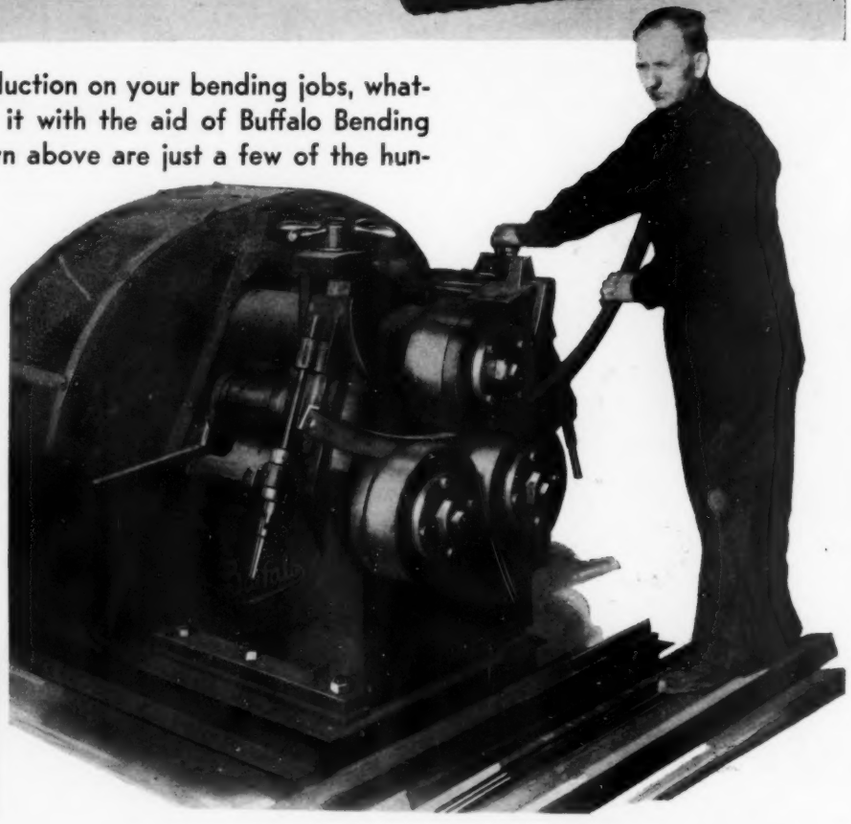
Any style of tables or bases can be furnished.

THERE'S A "Buffalo" Bending Roll for EVERY Bending Job

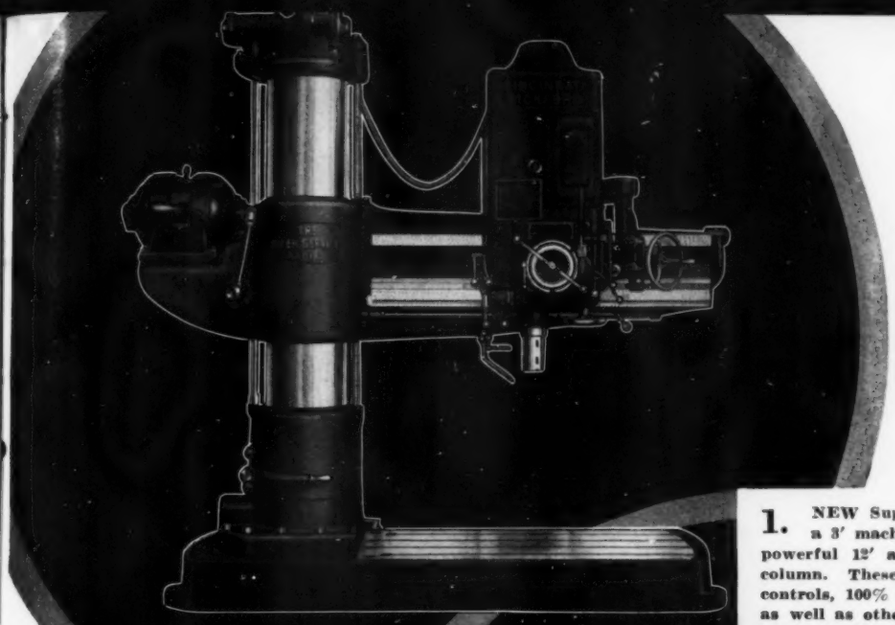


•If you want fast, accurate production on your bending jobs, whatever they may be, you can get it with the aid of Buffalo Bending Rolls. The samples of work shown above are just a few of the hundreds of jobs that Buffalo Bending Rolls are doing for industry.

The Vertical Bending Roll illustrated has special welded steel base. Machines are entirely self contained. Tell us your bending problems and we'll furnish a "Buffalo" Bending Roll to solve it efficiently and at a good profit to you. Write for Bulletin 351.



BUFFALO FORGE CO.
448 Broadway Buffalo, N. Y.
Branch Engineering Offices in Principal Cities
In Canada: Canadian Blower & Forge Co., Ltd. Kitchener, Ont.



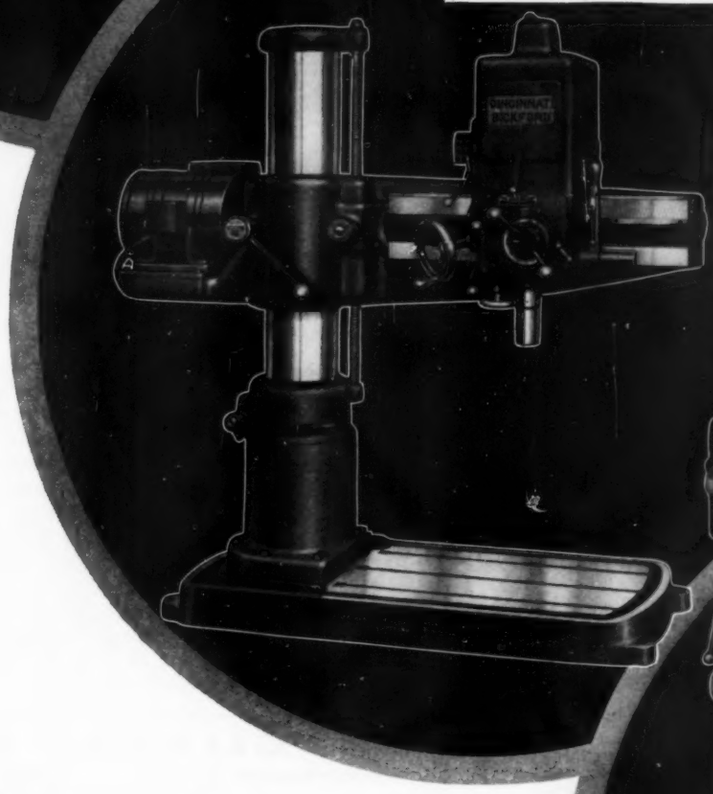
Three

NEW COST CUTTERS

to save time, effort and money

ON DRILLING OPERATIONS

1. **NEW Super-Service Radials—in all sizes from a 3′ machine with 11″ diameter column to the powerful 12′ arm machine having a 26″ diameter column. These improved machines offer new low controls, 100% centralized at the operating position as well as other modern features which will assure money saving in your drill department.**



2. **NEW High Speed 3′ and 4′ Super-Service Radials which provide a range of speeds ample for all work no matter how small your drilling requirements. These machines feature control of all speed and feed changes by sliding gears with single lever at the head. Fast and easy handling is assured by the mounting of balanced head and arm on antifriction bearings.**

- The most important machines in your shop include your radial and upright drills. New savings are possible with the recent Cincinnati Bickford developments. Features to give you "more holes per dollar" should be working for you now. Write for our latest catalogs.

3. **A NEW standard for convenience, stamina, accuracy and general production efficiency is offered in Super-Service Uprights. These drilling machines—in 21″, 24″ and 28″ sizes—are built in round and box column types. An important modern improvement is the elimination of all friction clutches in the construction of these machines.**

The Cincinnati Bickford Tool Company

Oakley, Cincinnati, Ohio, U. S. A.

Pullmore Clutches

Pullmore Multiple Disc Clutches have broad applications in machine tools, cranes, industrial trucks, printing, bookbinding, textile and similar automatic and semi-automatic machinery. They are reliable, compact, efficient, durable—provide years of satisfactory service even under heavy-duty operating conditions. Pullmore Clutches are made in single and double types, for operation in oil or dry, in capacities ranging from 2 to 75 horsepower at 500 r. p. m. Write today for our new catalog.

Rockford
O-C Toggle-Type & Spring-Loaded Clutches

Rockford O-C Toggle-Type and Spring-Loaded Clutches are used in tractors, agricultural machinery, road building, well drilling, marine and similar equipment. The O-C (over-center) clutches remain in or out of engagement until the position of the operating pedal or lever is changed. The Spring-Loaded clutches operate like an automobile clutch. Both types are available with single or double drive plates, for operation in oil or dry, in capacities up to 80 h. p. at 100 r. p. m. Investigate.

Rockford Drilling Machine Division
of Borg-Warner Corp., 10 Catherine St., Rockford, Illinois

Sold by MORSE CHAIN CO. Ithaca, N. Y. With offices in principal cities.

MARSCHKE
Heavy Duty
GRINDERS and BUFFERS

The MARSCHKE LINE includes Bench Grinders, Floor Stands, Buffers and Swing Frame Grinders of a wide variety of types and sizes.

These machines are available with AC and DC motors ranging from 1 to 25 H.P., for wheels from 10 to 30 inches in diameter with direct and indirect drives, giving constant and variable spindle speeds.

In short, the different MARSCHKE Grinder and Buffer specifications are sure to include *the machines for your particular requirements*, and having selected a MARSCHKE, you are assured of continuously uninterrupted, satisfactory service.

Ask the VONNEGUT MACHINERY DEALER in your territory—or let us send you the twenty-four-page catalog showing this full line of Grinders and Buffers.

VONNEGUT MOULDER CORP.
1809 Madison Avenue Indianapolis, Ind.

DIAMONDS

Skillful grinding operators appreciate the advantages of Trumore Diamond Tools.

Do your diamonds wear too fast? You need our selected stones. Do your diamonds become loose? You need our positive Statite mounting. Trumore diamonds are unsurpassed for service. Prices as low as ordinary tools. Write for price list today.

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BAUMBACH
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BETTER-MADE
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AT LOWER COST
24 Styles -- 95,000 Sizes
Send for our new 208 page catalog
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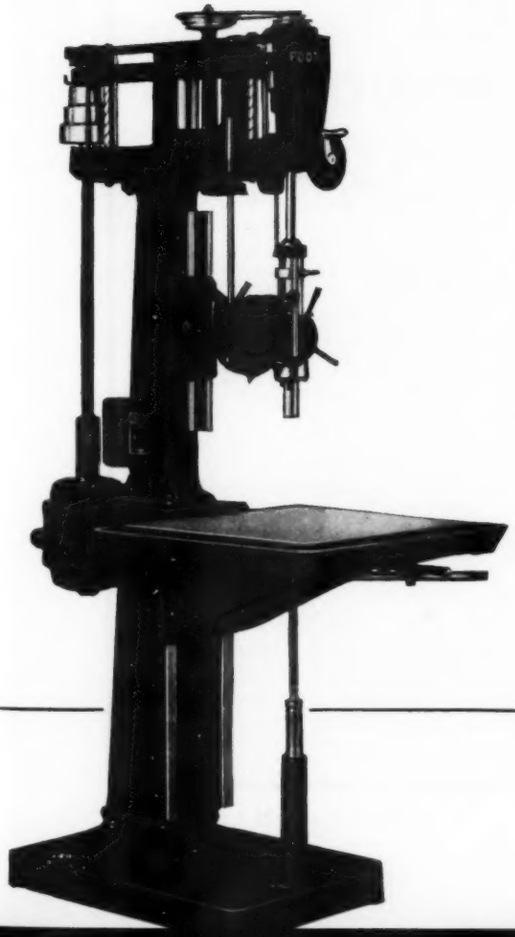
1812 South Kilbourn Ave., Chicago, Ill.

17 STYLES AND SIZES
MERRELL
PIPE THREADING for BETTER threads MACHINES
TOLEDO, OHIO

MORE POWER *to the Drill Point!*



FROM motor to drill point Footburt engineering is centered on the ultimate purpose of a drilling machine . . . more power in drilling holes. Every bearing, gear, shaft or belt is carefully selected for strength, quietness and long life. Your choice of Footburt drilling machines will mean drilling satisfaction. May we have your next inquiry?

THE FOOTE-BURT COMPANY

CLEVELAND, OHIO

Detroit Office:
4-151 General Motors Bldg.

Chicago Office:
525 Washington Blvd.

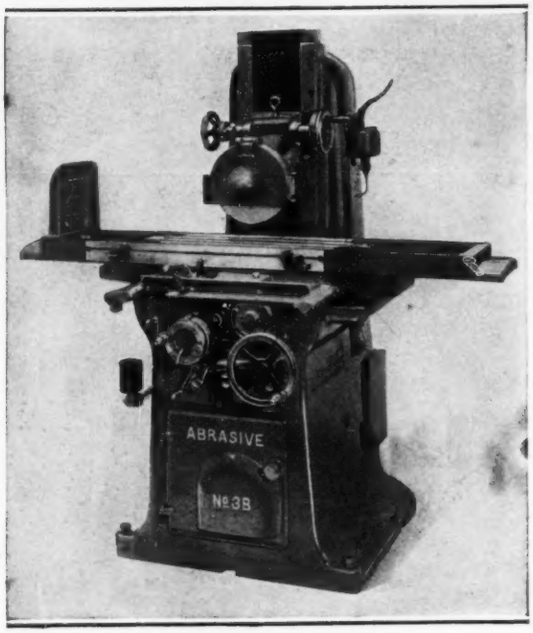
Manufacturers of special drilling, boring and surface broaching machines.

FOOTBURT

The Footburt line of Sipp type sensitive drilling machines is well represented by this ball-bearing spindle No. 2 size machine. Both smaller and larger sizes are available.

MASTER TOOLS *by* MASTER BUILDERS

for those Who Want the Best . . .



No. 3-B SURFACE GRINDER

Fast, Accurate *and* Powerful beyond all previous standards

A 24″ x 8″ 12″ Automatic Surface Grinder for the most exacting requirements. Practically every feature contributes to big savings—for both tool room and many types of production work. It has:

Greater Power—because of the heavy, one-piece, well-ribbed bed casting, deep saddle, heavy spindle, and practical elimination of vibration.

Greater Speed—because the shock of table reversal is eliminated by an oil shock absorber built into the transmission case.

Greater Accuracy—because the 1⅝″ hardened and ground chrome-steel spindle is fitted to an adjustable phospher-bronze box at the front and with super-precision ball bearings at rear.

Greater Safety—because all belts and other fast-moving parts are fully enclosed. Wet grinding and Dust Exhaust Attachments can be furnished, if desired, with any Abrasive Grinding Machine.

ABRASIVE MACHINE TOOL CO.
EAST PROVIDENCE, R. I., U. S. A.

Vitrified Wheels

VITRIFIED WHEEL COMPANY
WESTFIELD MASS.

To familiarize you with the complete VITRIFIED LINE

All the advantages of economy, long life, accuracy and low cost production are available through standardization on Vitrified Grinding Wheels which are available for every kind of grinding job.

The Vitrified Line includes:

BORITE—for grinding steel of all kinds

CARBORITE—for cast iron, bronze, brass and aluminum

SILICATE BONDED—for grinding steel to a fine edge and also for surface grinding

SHELLAC BONDED—for high finish, and also in very thin sizes

RESINOID BONDED—for high speed service in snagging steel and malleable castings, etc., and also for cutting off.

Our representative will gladly recommend the wheel best suited to your grinding requirements. Full details of the Vitrified Line are available in our catalog. Ask for it.

For precision, finish and production

CARBORUNDUM OFFERS...

REG. U. S. PAT. OFF.

AUTOMATICALLY ACTUATED
●LEFT: Model KKLA employing all abrasive members—used in "rough honing" and removal of considerable stock.
●RIGHT: Model KKLF employing a combination of abrasive and non-cutting members—used in "finish honing." The non-cutting members guide the hone into the bore and prevent undesirable abrasive marks when hone is withdrawn.
HUTTO ENGINEERING

TWO HIGH PRODUCTION CYLINDER HONES

(HUTTO PATENTED)

THESE two hones have been developed for the accurate, precise and "deluxe finish" honing of cylinder bores on a high production basis. They are free from complicated settings and moving and wearing parts—no need for frequent adjustments. They are scientifically designed and constructed to stand up under the most severe working conditions.

Equipped with patented "Full-Floating, Opposed Cones" which provide for automatic and positive expansion of the abrasives. They allow for axial shift to insure even and economical stone wear. Uniform pressure applied to abrasives assures faster stock removal, greater accuracy, better finish and longer abrasive life.

Compact in design—driving head and hone an integral unit. All parts made of selected steel, hardened and ground to close tolerances to assure long life.

Carborundum engineering facilities and experience are always at your command to solve problems pertaining to cylinder bore honing where precision, finish and production are required.

This is the only organization which produces a complete set-up of hones, machines and abrasives, based on complete knowledge of the requirements in each case. No undivided responsibility.

Accuracy with speed

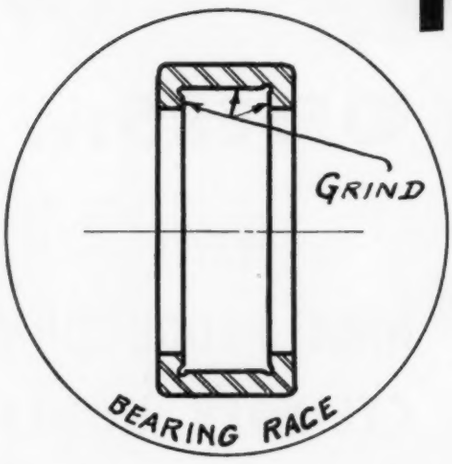
HUTTO MACHINE DIVISION

LYCASTE AVENUE, DETROIT, MICH.

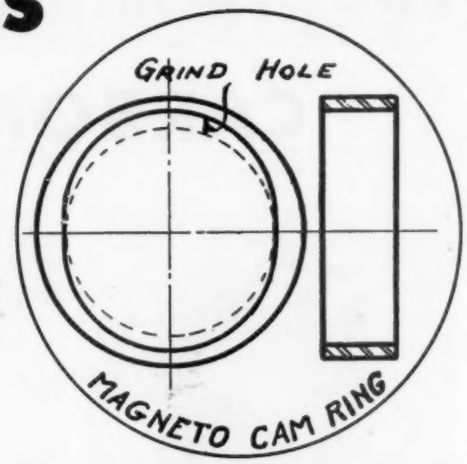
(CARBORUNDUM IS A REG. TRADE-MARK OF THE CARBORUNDUM COMPANY)

THE CARBORUNDUM COMPANY

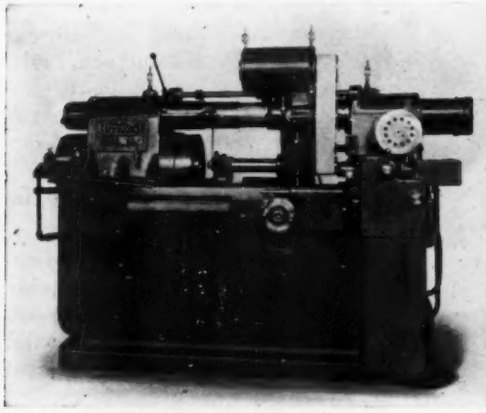
Holes



ALL TYPES
ALL SIZES
GROUND ON



BRYANT GRINDERS



No. 16 Bryant Grinder

For Medium Size Work

Furnished in three sizes: 16–16″ swing, 16–28″ swing, 16–38″ swing. Also two spindles for hole and face grinding, No. 16-A.

No. 4 Bryant Grinder

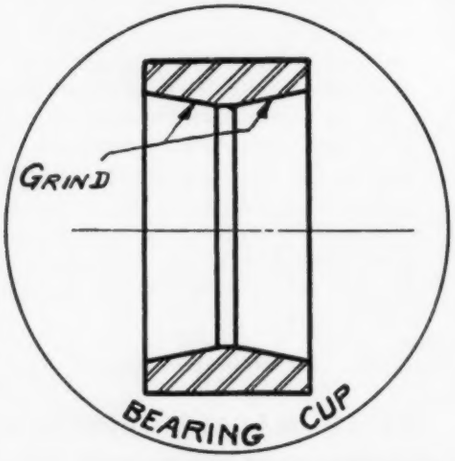
For Small Work

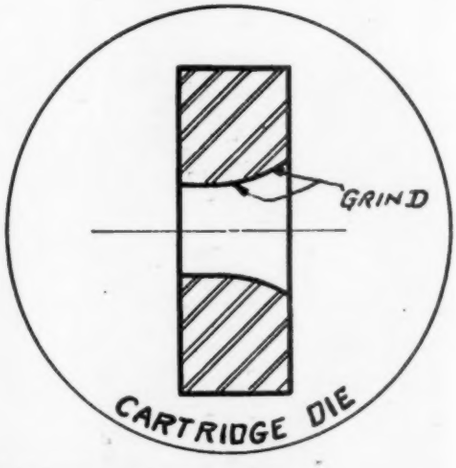
No. 4 with automatic sizing. No. 5 without automatic sizing. No. 5-B with adjustable work head for grinding steep tapers. No. 5-A with two spindles for hole and face grinding.

No. 24 Bryant Deep Hole Grinder

For Large Heavy Work

Furnished in two sizes: No. 24–21″ swing, No. 24–31″ swing.

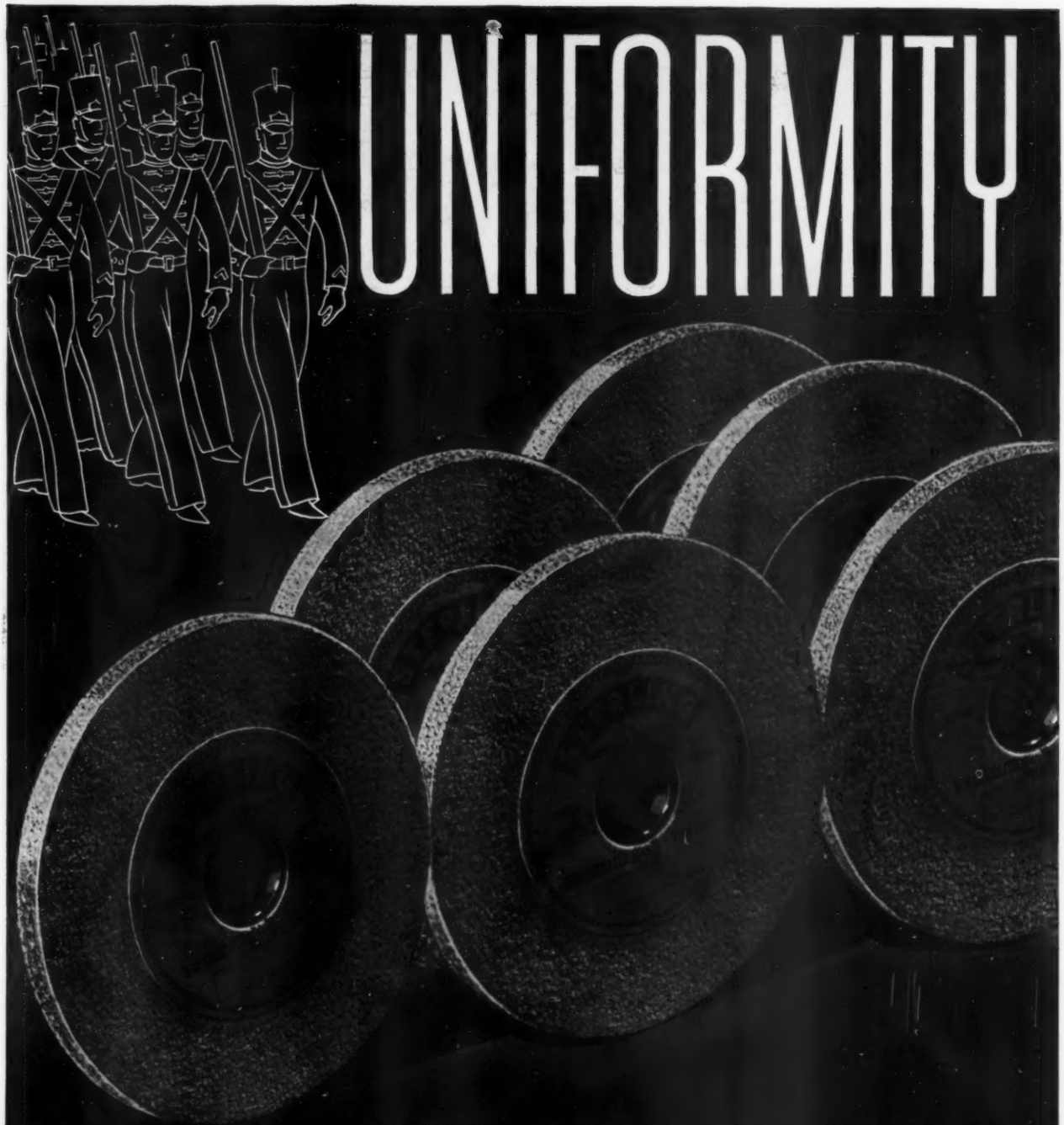




BRYANT CHUCKING GRINDER CO.

Springfield, Vermont, U. S. A.

UNIFORMITY



● Sterling wheels have long been recognized as of uniform structure, uniform grades and uniform action in grinding and cutting.

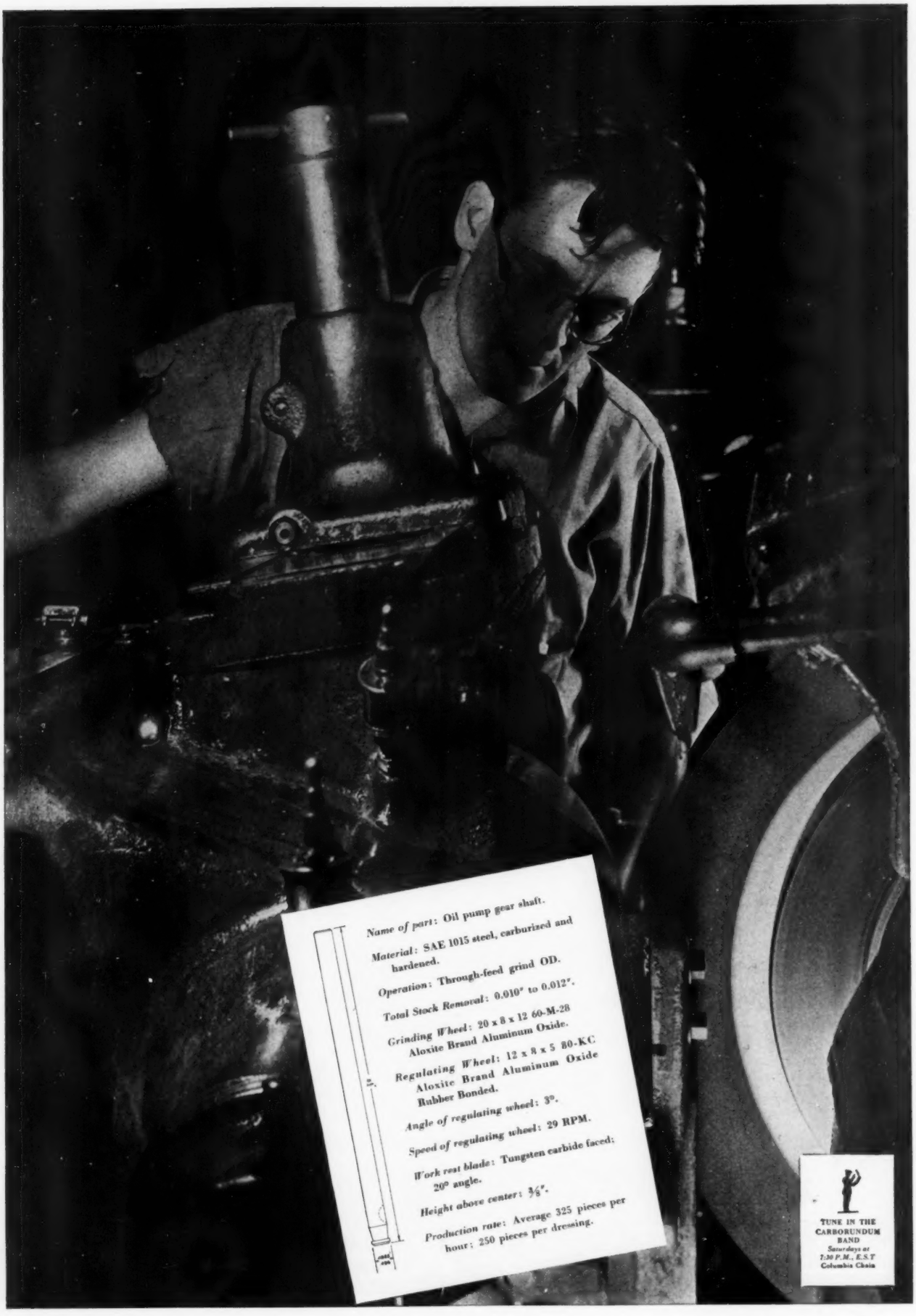
A uniform product brings to its users the utmost in service, production and low costs. Sterling uniformity will give you all three.

USE STERLING—THE WHEELS OF INDUSTRY

THE STERLING GRINDING WHEEL CO. • Factory and Office: TIFFIN, OHIO • CHICAGO: 912 W. Washington Blvd. • DETROIT: 101-107 W. Warren Ave.

Abrasive Division of The Cleveland Quarries Co

STERLING CLEVELAND STERLING ABRASIVES


Name of part: Oil pump gear shaft.
Material: SAE 1015 steel, carburized and hardened.
Operation: Through-feed grind OD.
Total Stock Removal: 0.010" to 0.012".
Grinding Wheel: 20 x 8 x 12 60-M-28 Aloxite Brand Aluminum Oxide.
Regulating Wheel: 12 x 8 x 5 80-KC Aloxite Brand Aluminum Oxide Rubber Bonded.
Angle of regulating wheel: 3°.
Speed of regulating wheel: 29 RPM.
Work rest blade: Tungsten carbide faced; 20° angle.
Height above center: 3/8".
Production rate: Average 325 pieces per hour; 250 pieces per dressing.
TUNE IN THE CARBORUNDUM BAND
Saturdays at 7:30 P.M., E.S.T.
Columbia Chain

CARBORUNDUM
BRAND
ABRASIVE PRODUCTS

THE DEVELOPMENT OF CENTERLESS GRINDING IS CLOSELY ALLIED WITH WHEELS BY CARBORUNDUM

REG. U. S. PAT. OFF.

Hand in hand with the development of centerless grinding has gone the progress of Carborundum research in the perfecting of centerless grinding wheels. Wheels that must be produced in a wide range of gradings to meet the conditions of the multitude of jobs done by the versatile centerless grinder. Wheels in all the types of abrasives made by The Carborundum Company, the Aloxite Brand Aluminum Oxide and the Carborundum Brand Silicon Carbide which are commonly used in a wide field of application.

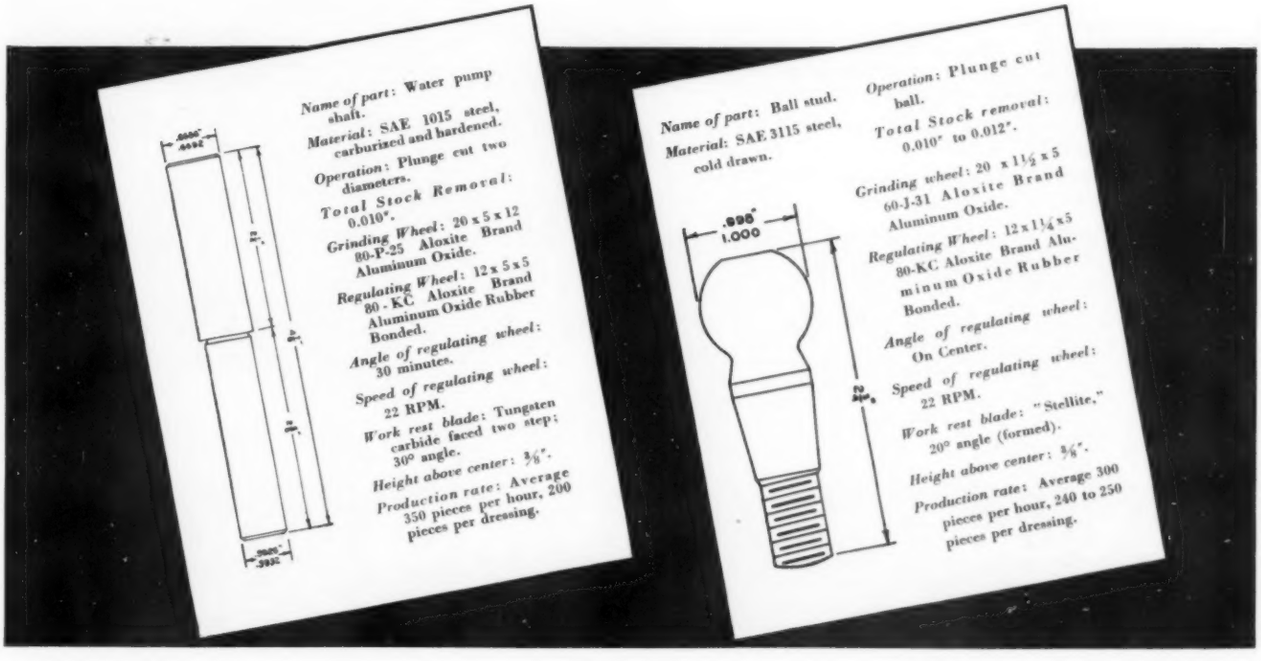
Wheels that cut with speed—that are uniform in grit and structure, producing finishes from the commercial to the ultra. Wheels that, in order to keep pace with the modern centerless methods, must give maximum production at minimum wheel costs.

Production figures shown are authenticated cases.

THE CARBORUNDUM COMPANY, NIAGARA FALLS, N. Y.

Sales Offices and Warehouses in New York, Chicago, Boston, Philadelphia, Cleveland, Detroit, Cincinnati, Pittsburgh, Grand Rapids

(Carborundum and Aloxite are registered trade-marks of The Carborundum Company)


Name of part: Water pump shaft.
Material: SAE 1015 steel, carburized and hardened.
Operation: Plunge cut two diameters.
Total Stock Removal: 0.010".
Grinding Wheel: 20 x 5 x 12 80-P-25 Aloxite Brand Aluminum Oxide.
Regulating Wheel: 12 x 5 x 5 80-KC Aloxite Brand Aluminum Oxide Rubber Bonded.
Angle of regulating wheel: 30 minutes.
Speed of regulating wheel: 22 RPM.
Work rest blade: Tungsten carbide faced two step; 30° angle.
Height above center: 3/8".
Production rate: Average 350 pieces per hour, 200 pieces per dressing.
Name of part: Ball stud.
Material: SAE 3115 steel, cold drawn.
Operation: Plunge cut ball.
Total Stock removal: 0.010" to 0.012".
Grinding wheel: 20 x 1½ x 5 60-J-31 Aloxite Brand Aluminum Oxide.
Regulating Wheel: 12 x 1¼ x 5 80-KC Aloxite Brand Aluminum Oxide Rubber Bonded.
Angle of regulating wheel: On Center.
Speed of regulating wheel: 22 RPM.
Work rest blade: "Stellite," 20° angle (formed).
Height above center: 5/8".
Production rate: Average 300 pieces per hour, 240 to 250 pieces per dressing.

BIG DIVIDENDS
. . . in time saved!

BY USING

GRAND RAPIDS GRINDERS

No. 10B

Motor Driven. No. 6 to 1¼". ⅛" to 1⅛". Grinds Taps and Twist Drills.

The Style 10-B Combination Drill and Tap Grinder is but one of many combinations which it is possible for us to furnish.

Grand Rapids Drill Grinders, Tap Grinders, and Combination Machines pay for themselves in many plants in an unusually short time through saving in drills and taps alone.

Hundreds of users have proven that drills and taps sharpened on these machines cut faster, stay sharp longer, and produce more and better work.

Our many styles and sizes are illustrated and described in complete bulletins which are yours for the asking.

GRAND RAPIDS HYDRAULIC FEED SURFACE GRINDERS

NOW AVAILABLE IN 8 SIZES

OUR CUSTOMERS SAY—

"We reduced actual grinding time on this job from 12 hours to 30 minutes.

(signed) ....."

"The use of a Grand Rapids Hydraulic Feed Surface Grinder enabled us to reduce grinding time on louvre dies from 6½ hours to 35 minutes.

(signed) ....."

"It is without question the finest Surface Grinder we have ever used.

(signed) ....."

These reports came unsolicited from users of Grand Rapids Hydraulic Feed Surface Grinders.

Over 50% of our present record-breaking business coming from satisfied users.

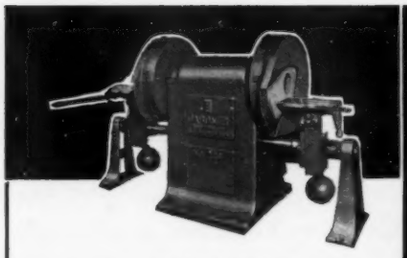
Surely, every Surface Grinder user should investigate the earning capacity of these machines.

May we send bulletin?

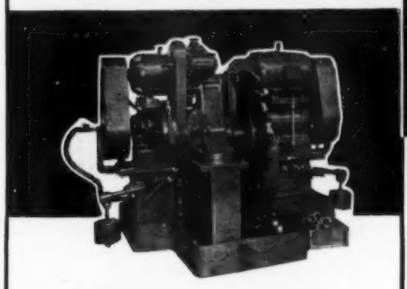
No. 65 Machine—Capacity 12" x 48" x 17". One of eight sizes in which Grand Rapids Hydraulic Feed Surface Grinders are now available.

GALLMEYER & LIVINGSTON CO.

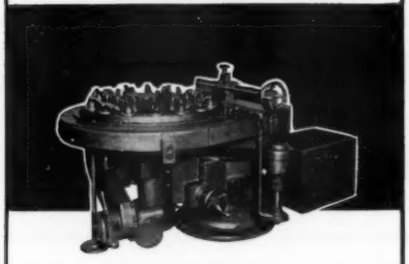
330 STRAIGHT AVENUE, S. W. GRAND RAPIDS, MICHIGAN



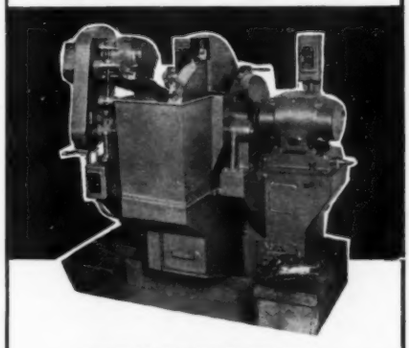
HAND OPERATED SINGLE SPINDLE DISC GRINDER



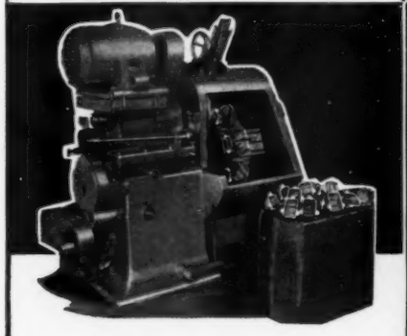
DOUBLE-HEAD GRINDER WITH ROTARY WORK CARRIER



HIGH-PRODUCTION HORIZONTAL GRINDER, ROTARY CARRIER



SPECIAL-PURPOSE GRINDER FOR BEER CAN OPENERS



20" SEMI-AUTOMATIC GRINDER ON AN AUTOMOTIVE JOB

Modern Requirements *demand* MODERN EQUIPMENT— like the late GARDNER models shown here!

THE requirements of 1937, in production and in accuracy, can never be met by antiquated machine-tool equipment.

Only machines of the most modern design and construction will permit you to successfully meet this era of ruthless competition.

In one field — FLAT SURFACE FINISHING — you can find many newly-designed, MODERN Gardner Grinders, in hand-operated, as well as high-production types.

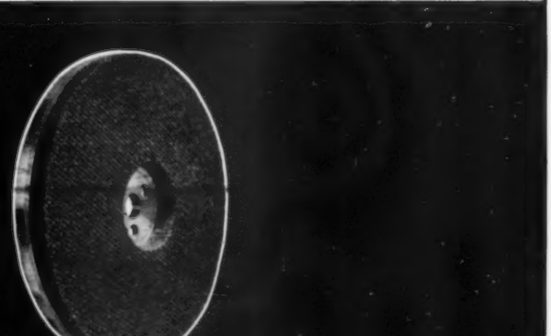
Whether your requirements are large or small — whether they call for extreme accuracy, or merely a clean-up — you should investigate these MODERN Gardner Grinders.

Write for Catalog!

GARDNER MACHINE COMPANY

410 East Gardner Street ✓ ✓ ✓ Beloit, Wisconsin, U. S. A.

(BELOW: A Gardner WIRE-LOKT Abrasive Wheel, built 1", 2" or 3" thick)



A BETTER HYDRAULIC GRINDER BY

THOMPSON

BUILT to produce accurate flat surfaces with a minimum expenditure of time and effort, the THOMPSON Hydraulic Surface Grinding Machines are speedy, accurate and powerful. Instantly available control not only instills confidence in the operator but is an important time saving item. Many other money and time saving features of these modern Thompson Grinders are described in our literature. Write for it today.

MODEL A
6 x 12 x 18

Hydraulic wheel head feed—Hydraulic rapid traverse — Hydraulic wheel truing—Sealed way bearings—Extra wide table — Power unit on rubber — Dynamically balanced —Automatic filter.

PROOF OF THOMPSON ECONOMY

The results of a recent survey under actual operating conditions show these facts:

PLANT A—Operation: Grind High Speed Steel Blanking die 12"x17"
Stock removal: .032"
Wheel size 20"x1½"x8", 36 grit, 1 grade.
Wheel head feed per reverse of table 3/16" to ½"
Table feed 95 feet per minute
Former grinding time 160 minutes
Present grinding time 28 minutes

PLANT B—Operation: Grind High Chrome-Carbon Blanking Die 8"x32"
Stock removal: .010"
Wheel size 16"x2"x5", 36 grit, S grade
Wheel head feed per reverse of table 3/16" to ⅝"
Table feed 86 feet per minute
*Former grinding time 270 minutes
Present grinding time 31 minutes

*Includes removal of dies sections due to inability of former machine to grind between guide pins.

THE THOMPSON GRINDER CO.

SPRINGFIELD, OHIO, U. S. A.

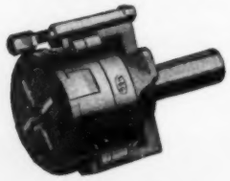
H & G Die Heads

H&G DIE HEAD

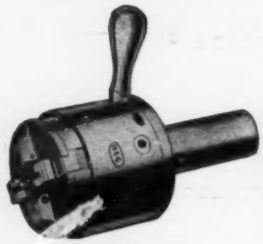
lower threading costs

On ALL types of machines

STYLE MM
for rotary spindles.



STYLE DM
for B&S Automatics and other small single spindles.



STYLE MS
for hand turret machines.

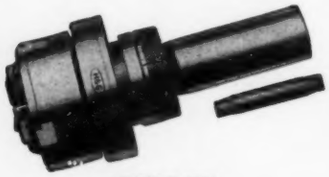
AT the left and below are shown the sensational H&G INSERT Chaser Die Heads. Designed to lower threading costs and to simplify the cutting of screw threads. Recommended for high production where chaser expense must be kept to a minimum and net production to a maximum.

At the right are shown the H&G General Purpose Die Heads. They are famous for their simplicity and strength and for the accuracy and long life of their hobbed chasers. Recommended for dependability on all kinds of screw thread cutting.

Write for Literature on H&G Die Heads and Threading Machines

THE EASTERN MACHINE SCREW CORP.
20-40 Barclay St., New Haven, Conn.

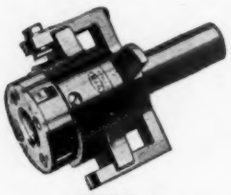
STYLE IMM
is equipped with improved internal trip for shoulder threading such as for spark plugs.



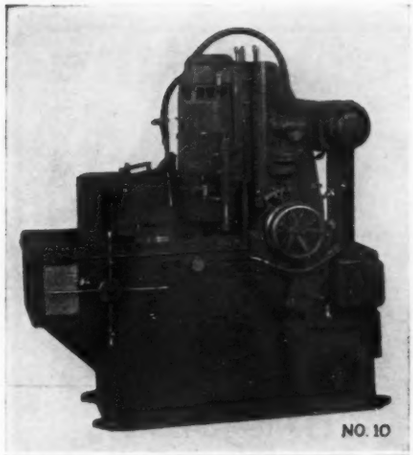
STYLE TM
has receding chasers for cutting superior quality taper pipe threads.

STYLE EE (Rotary)
For automatics, threaders, etc., where the die head rotates.

STYLE C
Hand Closing for hand turret machines.



STYLE D
For Brown & Sharpe Automatics and other small machines.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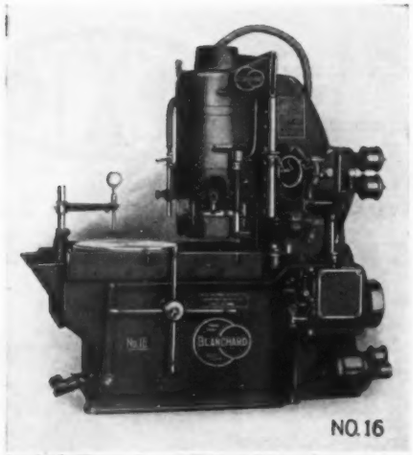
6

BLANCHARD SURFACE GRINDERS

cover a wide range of work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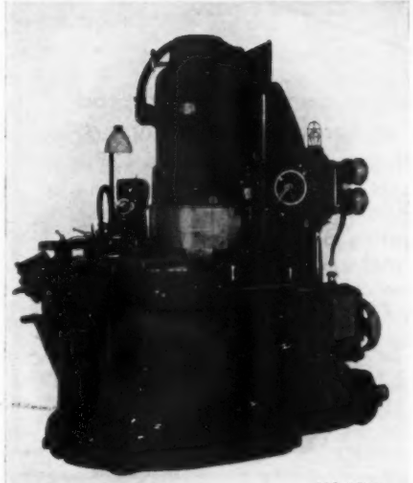
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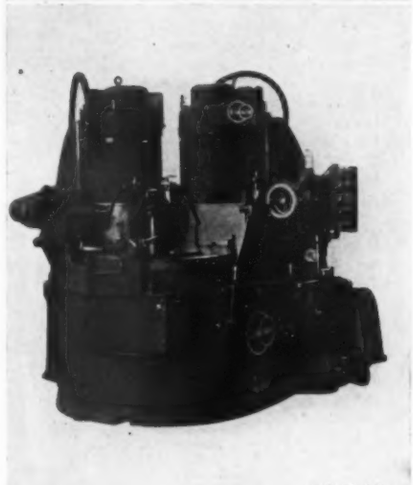
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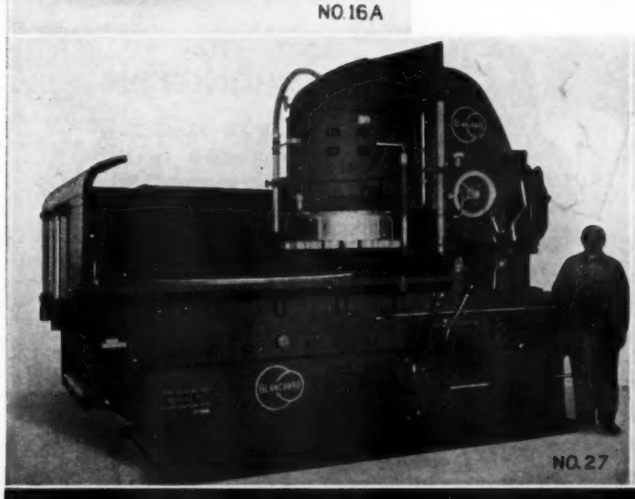
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For information on these machines and their application to your work write to

BLANCHARD MACHINE COMPANY

64 State Street, Cambridge, Mass., U. S. A.

1819 PEXTO 1937

MACHINES and TOOLS for SHEET METAL WORKING

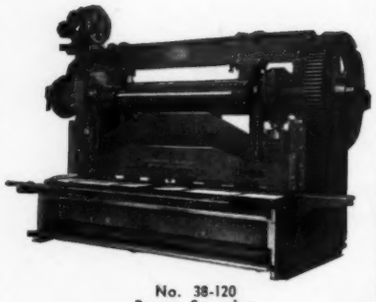
"Good for over 100 years—even better today"

SHEARS. Manual and Power Squaring Shears, Rotary Slitting Shears, Circle Shears, Ring and Circle Shears.

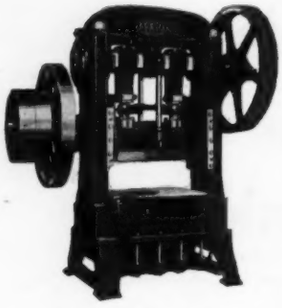
POWER PRESSES. Inclinable, Horn and Seaming, Riveting, Double-Crank Straight-Side and Arch Presses.

Production Equipment for Steel Drum and Barrel Making.

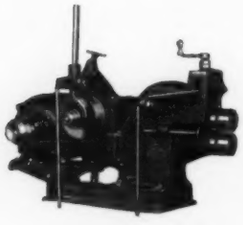
Hand and Power Folding Machines, Forming Machines, Grooving Machines, Folders and Brakes.



No. 38-120 Power Squaring Shears



No. GA 138 Straight-Side Double-Crank Press



No. 623 Universal Electric Rotary Machine

Manual and Motor Driven —Wiring, Burring, Setting Down, Turning, Elbow Edging, Beading, Crimping and Seam Closing Machines.

Stakes, Bench Plates, Hand Tools.

A complete line of equipment for the fabrication of sheet metal products. **Write us your requirements. Catalogs sent upon request.**

No. 528 Power Multiple Roll Forming Machine

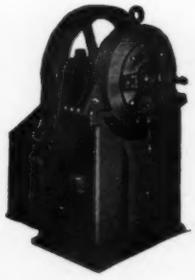
No. 2416 Motor Driven Slip Roll Forming Machine

THE PECK, STOW & WILCOX COMPANY
Established 1819
SOUTHINGTON **CONNECTICUT**

Put your finishing problem up to Specialists.

—whether parts or finished products—ferrous or non-ferrous—stampings, forgings, castings, spinnings or screw machine products—the cleaning, washing, tumbling, rinsing, drying, pickling, plating, burnishing or separating problem that puzzles you may have been met and whipped by Ransohoff engineers in some other industry. Put it up to us. If we reach a solution, we'll build labor-saving machinery for you to make it effective.

N. RANSOHOFF, Inc.
W. 71st St. at Millcreek Carthage, Cincinnati, O.



THE TORRINGTON

SWAGING MACHINE — with 4000 forceful squeezing hammer blows per minute—makes metal tougher and more elastic. Send for booklet—"The Modern Art of Swaging."

The Torrington Co., Standard Plant
56 Field Street Torrington, Conn.

GRANT

RIVETERS—PIONEERS in their line—Head rivets from smallest to ⅜" diameter either by NOISELESS SPINNING or VIBRATING HAMMER method—Sizes to meet all needs—Types include Vertical and Horizontal Multiple Spindles.

Write for literature — and don't forget to send samples.

THE GRANT MFG. & MACHINE CO.
85 Silliman Ave., Bridgeport, Conn., U. S. A.

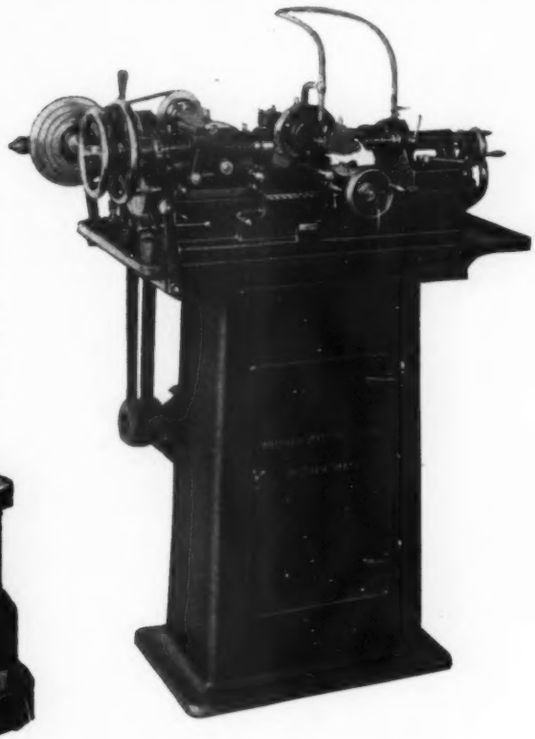
Send sample pieces and blanks to WALTHAM . . . get a time-study report of "pieces per hour on these machines"

WALTHAM SEMI-AUTOMATIC PRODUCTION OR TOOL ROOM THREAD MILLERS

Designed to thread small parts with precision at high speed. Built for operation by unskilled labor. Will cut, V, N.S., Form, Acme, Whitworth, Buttress and many types of special threads. Made in 2 types: for bench use with countershaft drive or floor use and motor drive.

SPECIFICATIONS

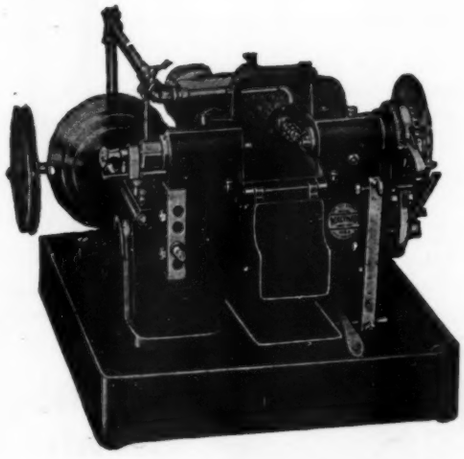
Swing over carriage	3 in.
Diameter of work for which machine is best adapted	2 in.
Length of thread cut, work held on centers	8¾ in.
Length of thread cut, work held in spring chuck	10 in.
Extreme distance between centers	12 in.
Dimensions of reservoir base	19x34 in.
Weights of standard equipment	390 lb.
Motor required	½ hp.
Weight of cabinet base	270 lb.



SUB-PRESSES and DIES

They meet every demand for stamping out small parts in one operation. The parts are produced ready for assembly or for further manufacturing operations without hand finishing. The accurate alignment and rigidity insure uniform precision in stamping.

If you prefer to make your own dies, Blank Cylindrical Sub-Presses in 9 sizes, either Arch or Over Hang Type, can be supplied. Send for Price List.



AUTOMATIC GEAR AND PINION CUTTING MACHINE

This is a production machine for cutting small gears and pinions up to 1½ inch pitch diameter. It is especially adapted to cut watch, meter and gauge pinions, gears or sectors. Magazine feed for handling small diameter pinions makes the machine fully automatic.

We also make a 4 inch size and can furnish cutters for either size.

SEND FOR DESCRIPTIVE BULLETINS

WALTHAM MACHINE WORKS

HIGH STREET WALTHAM, MASS.

Foreign Representatives: Buck and Hickman, Ltd., London; Fenwick Freres Co., Paris; Andrews & George Co., Tokyo, Japan; Andrews & George Co., Seoul, Korea; Andrews & George Co., Darien, Manchuria.

WALTHAM
TRADE MARK
REG. U.S. PAT. OFF.
MACHINES

Important Improvements in DAVIS KEYSEATERS

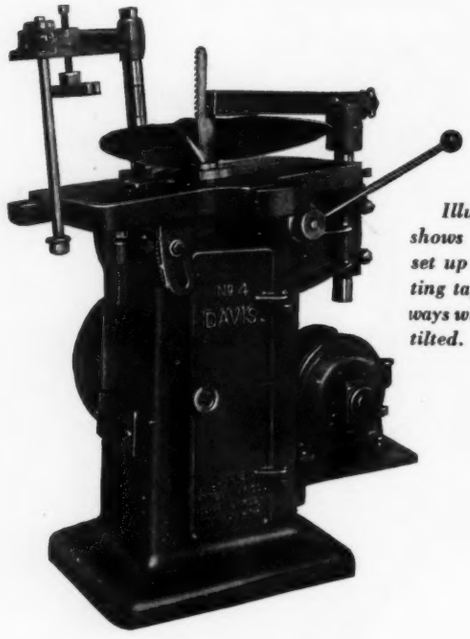


Illustration shows typical set up for cutting taper keyways with table tilted.

Tie with Today's Movement TOWARD MODERNIZATION

The cutter is set up in vertical position and remains vertical during the entire cutting process. The resistance arm back of cutter is adjustable to accommodate cutters of different widths or depths, and work of various heights.

The feed is table type, operated by hand lever in connection with pinion, meshing with rack attached to table. A graduated collar on feed shaft indicates depth of cut.

For cutting taper keyways the table may be inclined in either direction from horizontal, and a scale is provided to indicate the exact taper per foot for which it is set.

This is a very important improvement over our older machines in which the table was stationary.

The table is slidably mounted on accurately machined ways with a gib to take up wear.

Machines are made in three sizes for keyways 1/16" to 1½" in width.

Write us for new descriptive bulletins and detailed specifications.

DAVIS KEYSEATER COMPANY
403 Exchange St., Rochester, N. Y.

KENT-OWENS MILLERS *ARE ADAPTABLE*

●

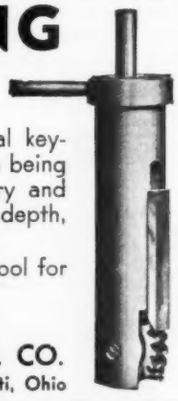
There are many special features available in Kent-Owens Millers. Some of these are Variable Speed Drive, Double Spindle Construction, Cam Feed Head, Multiple Spindle Heads, Cam Actuated Table Feed and many individual mechanisms.

The utilization of these features gives the Kent-Owens Millers greater flexibility, broader usefulness and materially reduces floor to floor time over a wide range of milling operations.

Write for specific information on your light and medium milling operations.

KENT-OWENS MACHINE CO.
958 Wall Street Toledo, Ohio

KEYSEATING MILLER

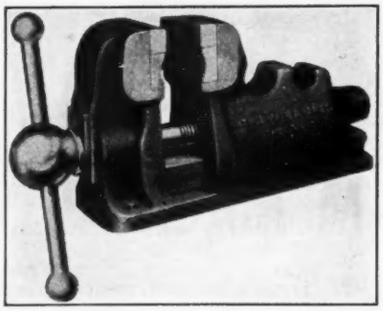


Use this miller for accurate internal keyseats. The miller slides thru the hole being keyseated, while the cutter is rotary and mill keyseats of uniform width and depth, with parallel sides.

Our oilgrooving Miller is a similar tool for straight, internal oilgrooves.

Write us for Catalog T

NATIONAL MACHINE TOOL CO.
2272 Spring Grove Avenue Cincinnati, Ohio



NEW ATHOL HEAVY DUTY STEAMFITTER'S VISE

●

WRITE FOR COMPLETE CATALOG X38

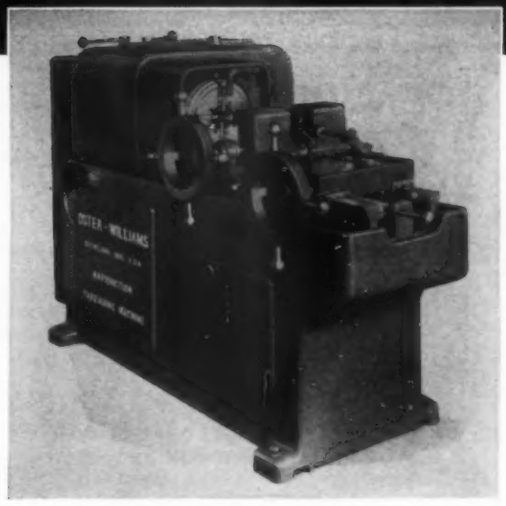
ATHOL MACHINE & FOUNDRY CO.
ATHOL, MASSACHUSETTS

No. 922, Double Spindle

Here's the boiled-down story of this machine. Designed primarily for straight bolt work, it is so completely adaptable that it efficiently handles practically every type of threading job. Built in two sizes. . . . No. 915, capacity ⅜″ to 1½″; No. 922, capacity ½″ to 2¼″; and in two types. . . . single spindle and double spindle; radial or tangential die-head as desired.

Though on the market only a relatively short time, sales of OSTER Rapiduction Bolt Threaders have far exceeded expectations. Wherever exhibited, it has drawn and held the crowd through its amazing versatility.

Write for bulletin giving complete details of this remarkable performer. It will be gladly supplied on request.



No. 915, Single Spindle

OSTER
THREADING EQUIPMENT
WILLIAMS

THE OSTER MANUFACTURING COMPANY

Threading Headquarters Since 1893

Sales Office: 2049 East 61st Street, Cleveland, Ohio

Factories: Erie, Penna., and Cleveland, Ohio

New York City Showroom and Office, 292 Lafayette St.

High Speed, Back-Geared, Shapers

for Tool Rooms or
Quantity Production

Designed and constructed for highest possible production, while at the same time maintaining an unsurpassed standard of quality and accuracy. Available in five heavy duty sizes, 12″—16″—20″—25″ and 32″ stroke.

The 12″ model here illustrated has unit-type speed box with Timken bearings and eight speeds—V-type ram with 55° Vee ways. Pressure type automatic lubrication with filter and strainer—oil pump direct connected. Motor is flange mounted and has its own speed-reducing gear. Power is transmitted through multiple-disc duplex clutch, one end functioning as clutch, the other as brake, with entire unit running in an oil spray.

Complete illustrated bulletins describing any or all models furnished promptly on request.

THE SMITH & MILLS CO., Cincinnati, Ohio

For Your RIVETING

LINLEY NOISELESS ROTARY RIVET SPINNING MACHINES

Assure Peak Production and Lower Maintenance. Rigid and Powerful Bench and Floor Types. Motor or Belt Driven. There is a Linley machine for every riveting job.

Send samples of your work for riveting, cost of equipment, and true estimates on production.

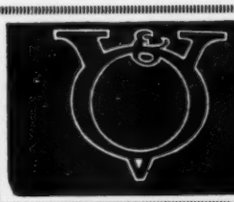
"Built to Last—Riveting Fast"

LINLEY BROTHERS CO.
581 Fairfield, Ave.
BRIDGEPORT, CONN.

For production or job work—fast and accurate on a wide range of slotting, keyseating, splining and grooving. Work centers itself—requires no skilled operator Write for catalog.

Giant KEYSEATERS

MITTS & MERRILL
913 Tilden St.
Saginaw, Michigan



PRESSES
FEEDS
AUTOMATIC EQUIPMENT
THE V&O Press Co.
HUDSON, N. Y.

MAUREY PRESSED STEEL **V-PULLEYS**

Single A-Groove 1¼″ to 15½″ O.D.
Single B-Groove 2″ to 19″ O.D.

—WITH EXTRA HEAVY HUBS
—TURNED FROM SOLID STEEL
—OR IN MALLEABLE IRON

All Bore Sizes CARRIED in STOCK

CARL A. MILLER & CO.
Write for Catalog and Prices
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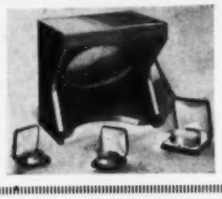

NEW LIGHT WAVE EQUIPMENT

Send for circular M 21 on how to use light waves and greatly reduce wear on optical flats.
Catalog 29 shows how to measure screw threads and gears with precision wires.

THE VAN KEUREN CO.
Watertown Mass.

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THE NILES TOOL WORKS CO. | THE PUTNAM MACHINE CO.

OFFICES IN ALL PRINCIPAL CITIES — *Divisions of* GENERAL MACHINERY CORPORATION *Hamilton, Ohio* — FOREIGN DEPT 111 BROADWAY

INGERSOLL *Inserted Blade*
CUTTERS FOR ALL PURPOSES

MEDIUM DUTY

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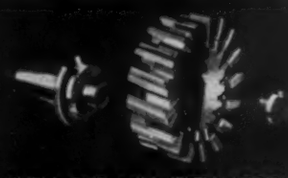
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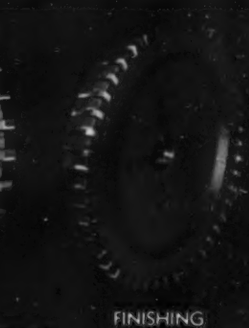
ROUGHING
100% MORE BLADE WEAR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INGERSOLL *Ray-Blade* FACE MILLS FOR HIGH PRODUCTION

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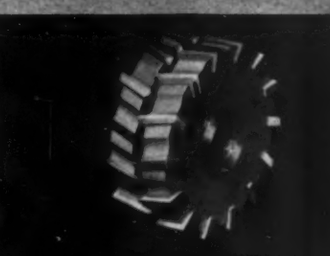
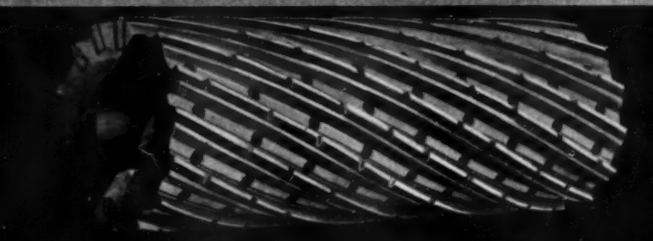
STAGGERED TOOTH CUTTERS

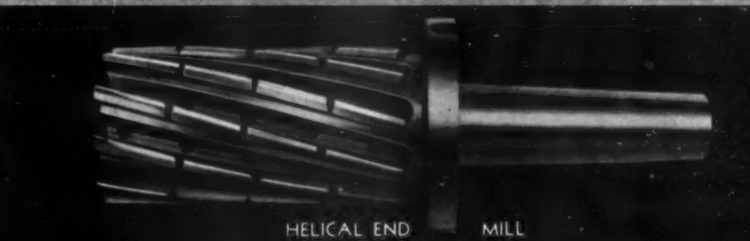

INTERLOCKING SIDE MILLS

PLAIN SIDE MILL

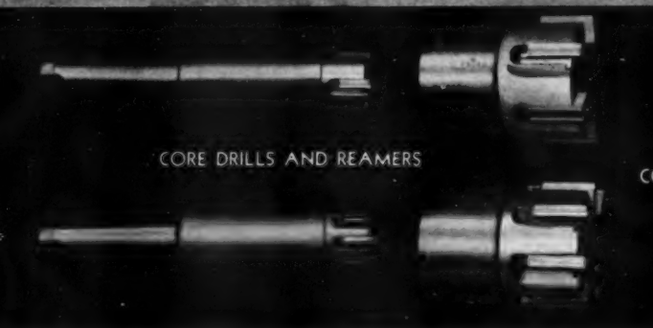
NARROW 3-LOCK CUTTER

INGERSOLL ZEE LOCK SIDE MILLING CUTTERS


HELICAL SLAB MILL


HELICAL END MILL

INGERSOLL INSERTED BLADE HELICAL MILLING CUTTERS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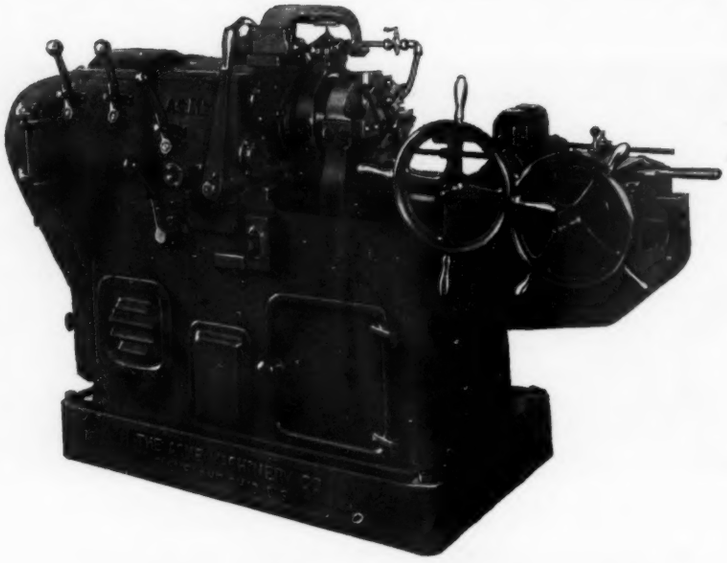
THE INGERSOLL MILLING MACHINE CO., ROCKFORD, ILLINOIS

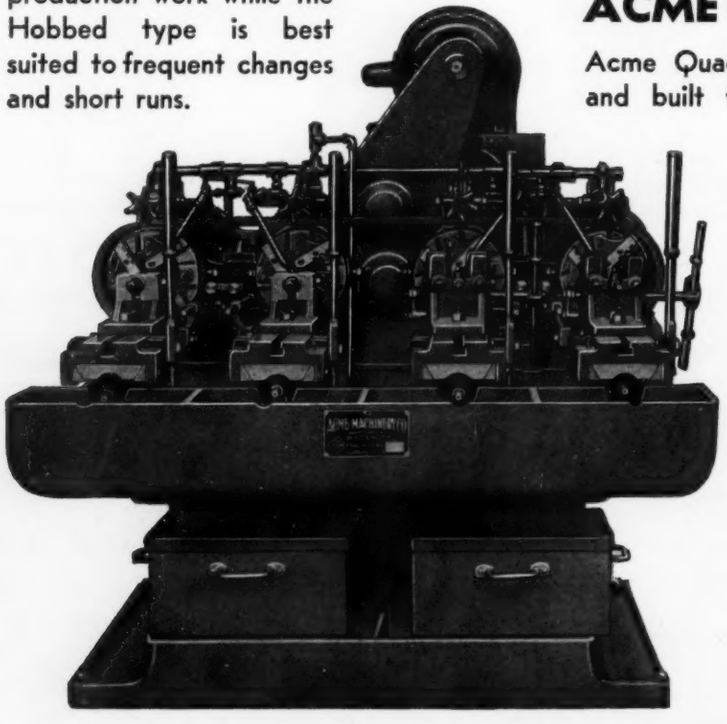
MODEL 35 ACME
THREADING MACHINE



● This new, streamline threading machine is built in three sizes and in double, triple and quadruple types. The model 35 Acme Threader features a self-contained selective type gear box which provides eight speed changes by means of levers at the front of the machine. These machines can be furnished with either Acme Tangent or Acme Hobbed Die Heads: The Tangent type being particularly adapted to production work while the Hobbed type is best suited to frequent changes and short runs.

ACME Bolt Threading Machines

Acme Quadruple Threading Machines are designed and built for high speed, economical production. The well known highly efficient Acme Tangent Die Heads are standard equipment and insure accurate, clean cut threads, ease of operation and continuous service. A wide range of feeds is provided by means of pick off gears located at the rear of the machine. For work up to 2 inches in diameter Acme Threading Machines offer the utmost in long life, flexibility and economical production.



ACME NUT TAPPING MACHINES

The Semi-Automatic Nut Tapper illustrated is one of the most widely used of the Acme line of Nut Tappers. Vertical spindle movements are automatic, the machine is fitted with quick acting ring sockets, all sizes, being interchangeable, feeding chutes are adjustable to accommodate different sizes of nuts. The machines are also built for threading pipe couplings, wingnuts and special work and in six, eight and ten spindles.

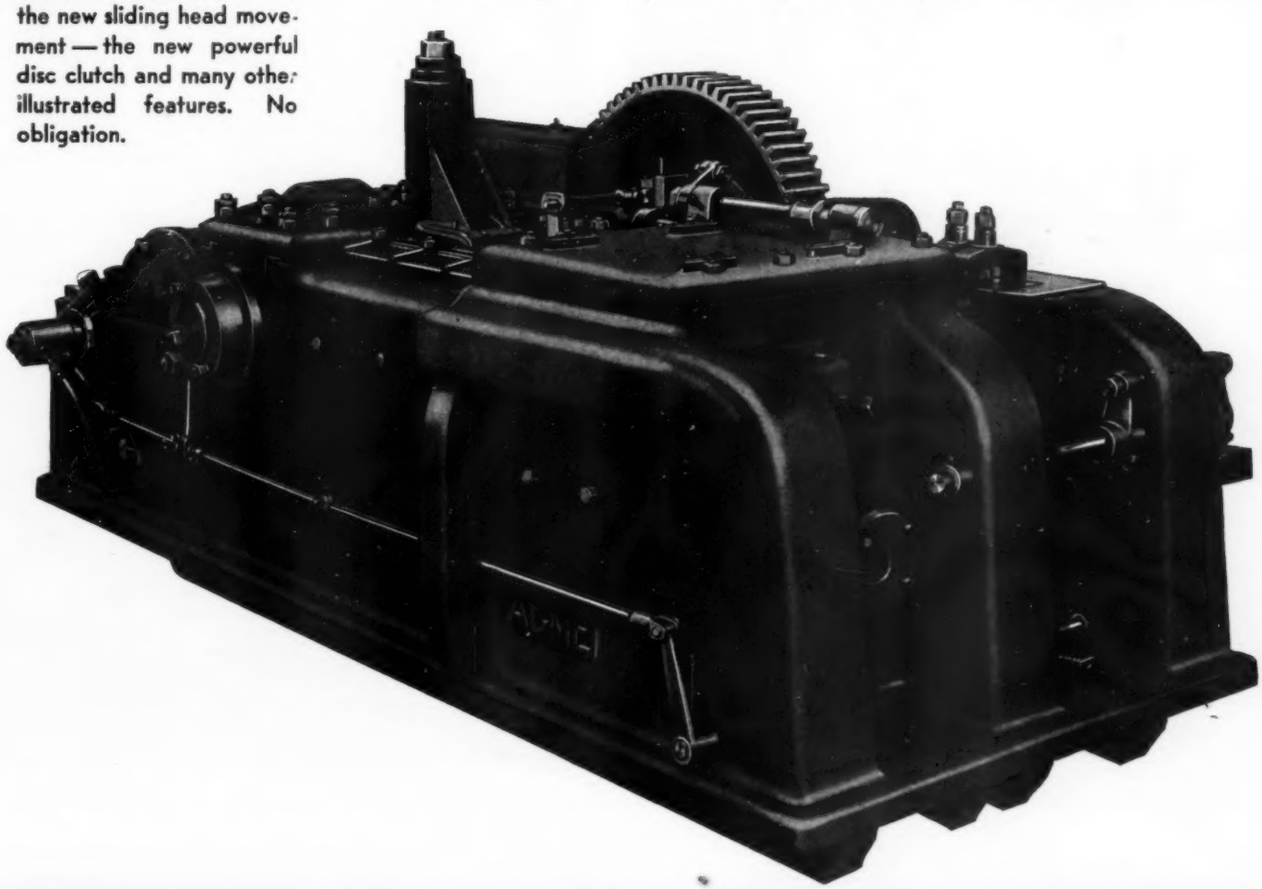
MODEL 35 ACME
ALL STEEL HEADING, UPSETTING AND FORGING MACHINE . . . . . .

This bulletin covers in detail the design and construction of the Model 35 Acme Forging Machine. Get a copy of this highly instructive booklet — see the new sliding head movement — the new powerful disc clutch and many other illustrated features. No obligation.

THE Acme Machinery Company presents the latest development in forging machine design and construction. Cushioned starting and stopping with the thoroughly tested and proved Disc Clutch provides instantaneous starting, ease of operation, greater production and better forgings.

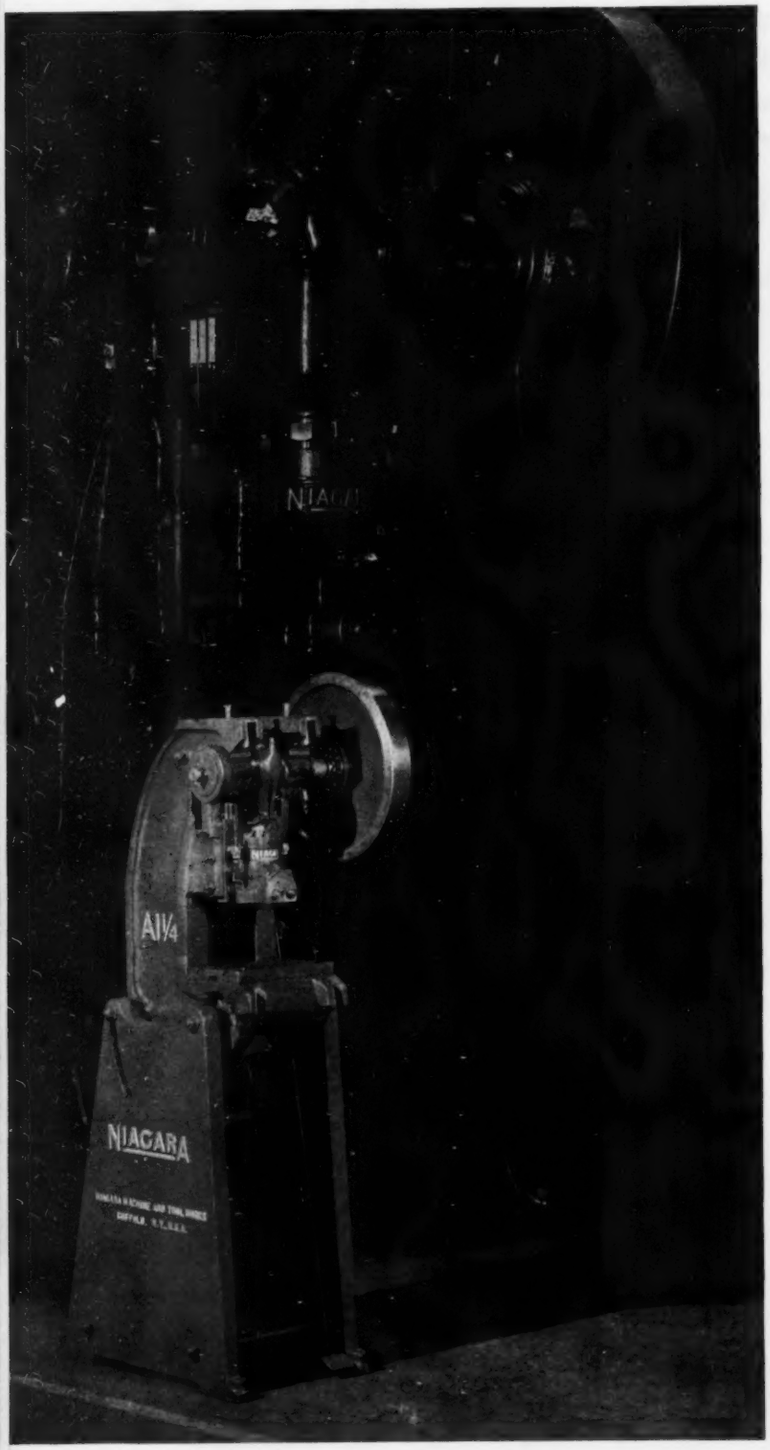
The new eccentric main shaft construction with sliding head, not only eliminates the conventional Pitman movement but assures much smoother operation, accurate alignment of header tools and greater power.

Acme Upsetting and Forging Machines are built in 10 sizes covering a complete range from 3/4" to 5" inclusive.



THE ACME MACHINERY CO.
CLEVELAND, OHIO, U.S.A.

NIAGARA ADVANCES INTO 1937



Included in the advanced design of Niagara Master Series "A" Inclinable Presses are Steel Casting Frames . . . 14-Point-Engagement Sleeve Clutch with Built-In Single Stroke Mechanism . . . Multiple "V" Gibs . . . Strong, Rigid Slides with Breech Block Die Clamp . . . Convenient One-Man Inclining Mechanism and other Improvements. Write for Bulletins.

with New Developments Important to Every Man Who Uses

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New and exclusive developments and improvements in Niagara Presses and Shears are responsible for new standards of Strength . . . Rigidity . . . Safety . . . Accuracy . . . Convenient Operation . . . Low Maintenance Cost.

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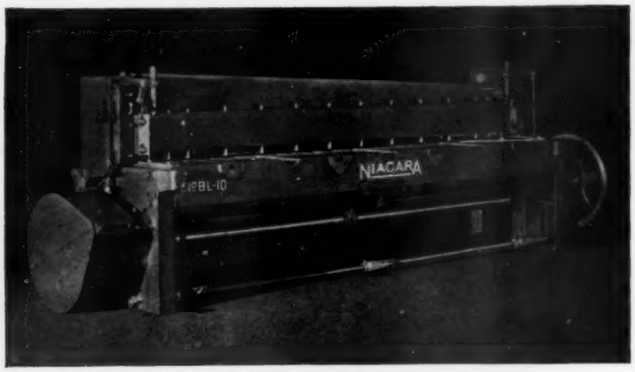

NIAGARA SERIES BL POWER SQUARING SHEARS

NIAGARA SERIES HL POWER SQUARING SHEARS

Equipped with drive running in oil and 14 Point Instant Acting Sleeve Clutch for more Strokes per Hour.

NIAGARA

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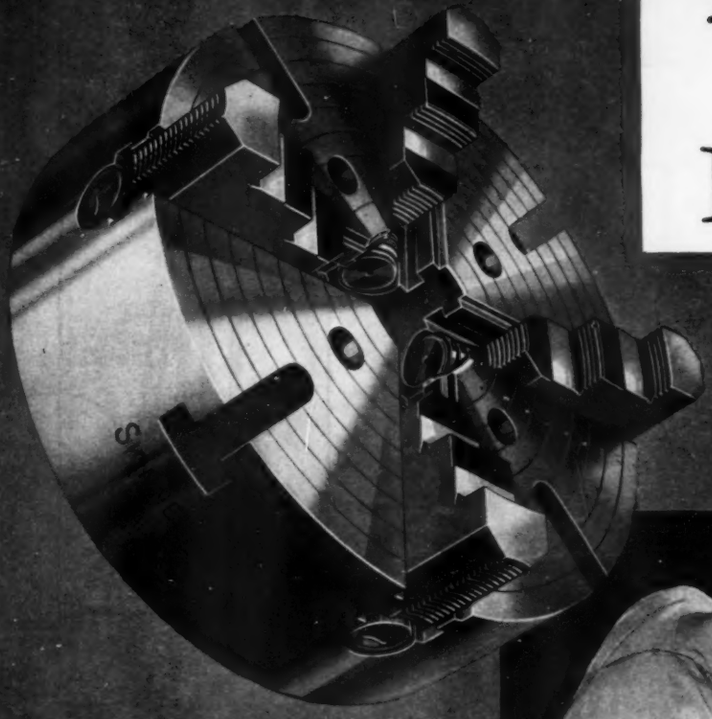
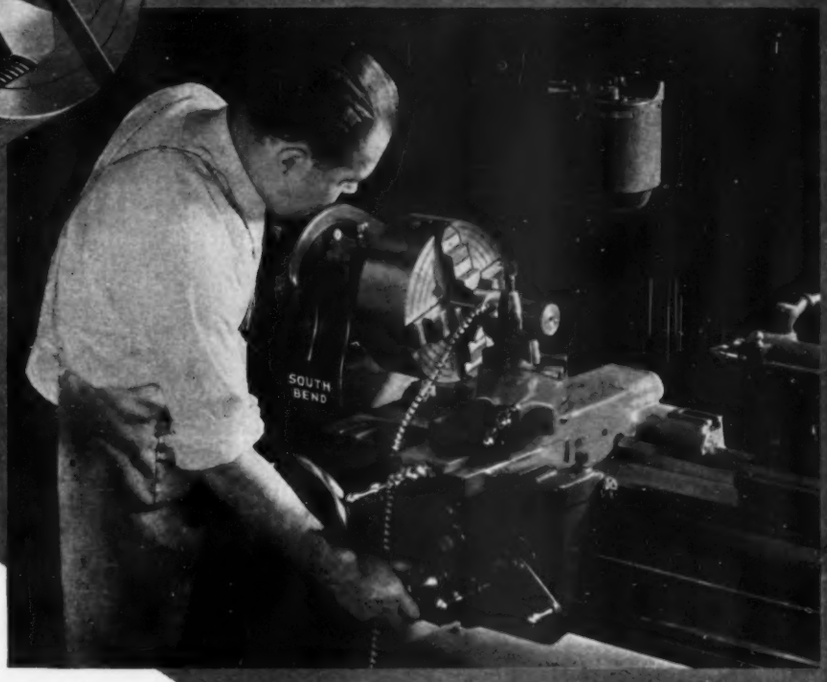
NEW YORK . . . DETROIT

PARTNERS *in* PRECISION





SKINNER Chuck is the perfect complement to the South Bend Lathe. Both are precision tools—the one provides the positive gripping power so necessary for the perfect performance of the other. It takes a Skinner Chuck to hold a job with a fast, sure grip . . a grip that remains true under the toughest operations . . a grip that makes possible the most exacting micrometric accuracy. With a Skinner Chuck the South Bend Lathe operates within the extremely close limits so necessary for perfection in tool room work. On the South Bend Precision Lathe —on *all* modern, fine machine tools, employ positive acting, thoroughly dependable Skinner Chucks.

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SKINNER CHUCK CO.

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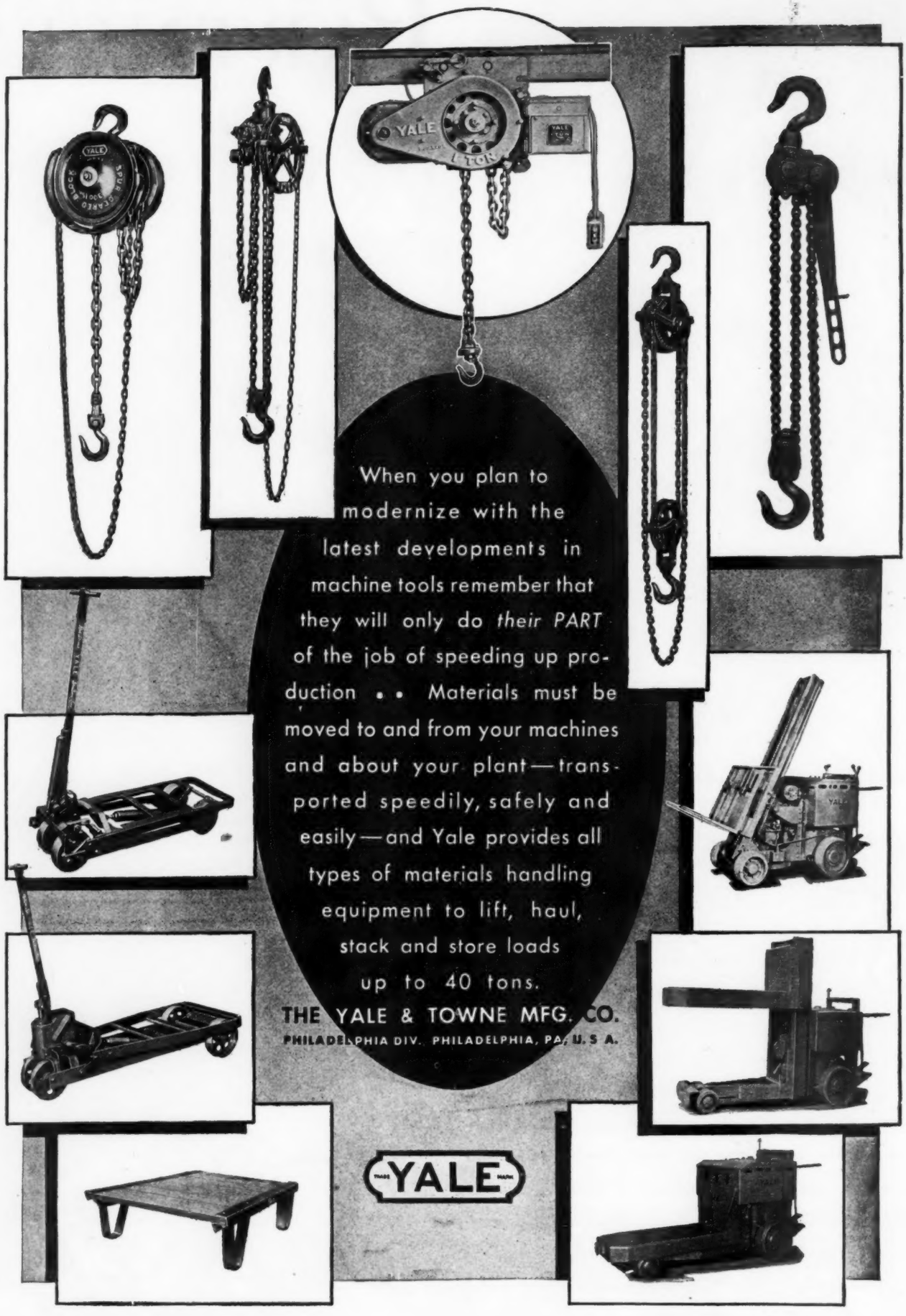
When you plan to modernize with the latest developments in machine tools remember that they will only do *their PART* of the job of speeding up production . . Materials must be moved to and from your machines and about your plant—transported speedily, safely and easily—and Yale provides all types of materials handling equipment to lift, haul, stack and store loads up to 40 tons.
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The Round Auto-Bloc excels all previous hoists in high-speed heavy-duty, easy lifting. Its unique 2-gear mechanism develops a hoisting efficiency of 90%. Simplified gearing and precision construction throughout eliminate excess weight and bulk. Timken bearing equipped.

Round

CHAIN HOISTS

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For dependable, trouble-free service, always select hoisting equipment from the David Round line. You get both the highest development in new design and construction and the time-tested features born of many years' manufacturing experience and close contact with material handling problems in the shop. Leader of the old established David Round line is the Auto-Bloc Chain Hoist. This sensational hoist, revolutionary in principle, typifies David Round accomplishment in the development of every form of material handling equipment.

Also Manufacturers Of

WELDED CHAIN
Sling Chains, Bundling Chains and other Specialties
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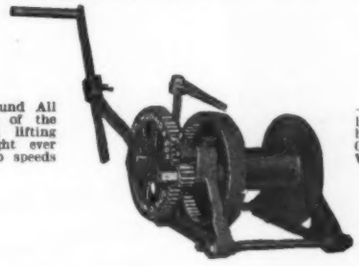
Round Hand Traveling Cranes are built in any desired style to suit requirements. Geared or Push type. Highest standards of structural steel design and construction employed throughout. A sturdy carrier that safely handles any load for which Cranes are designed.



The new No. 99 Round All Steel Winch is one of the most powerful hand lifting devices for its weight ever designed. It has two speeds —one for rapid lifting of light loads and the other for handling loads up to 5-tons. Operates in any position. Weighs only 135 lbs.

The Round Simplex Portable Crane enables one man to easily lift and transport heavy loads from one location to another. Handle control automatically locks wheels when released. Friction load brake and rubber tired wheels available at nominal additional cost.

Self-Aligning Steel-Plate Trollers designed for use on straight or curved I-Beams. Sturdy all-steel construction assures safety. Precision bearings permit easy travel along beam. Plain or Geared Type.

The Round Army Type Trolley Hoist Units are designed for use where headroom is limited. Built to fit specified sizes of I-Beams; the trolley is an integral part of the hoist. Trolley either Plain or (for over 3-ton capacity) Geared type.

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Associate Companies—The Cleveland Chain & Mfg. Co. Cleveland, Ohio. The Bridgeport Chain & Mfg. Co. Bridgepoport, Conn. Seattle Chain & Mfg. Co. Seattle, Washington. Round California Chain Corp., Ltd. So. San Francisco, Calif.

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★ .24 SULPHUR
★ COLD DRAWN

★ 1" Rd. — Speed Case — Cold drawn .24 sulphur, 85,000-lb. tensile strength, 80,000-lb. yield point.

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Do you know of any other steel (carbon or alloy) with this strength (85,000 lbs.) that can be tied in a tight knot in 1" Rd. cold drawn and still machine at over 200 surface feet per minute? For particulars write to

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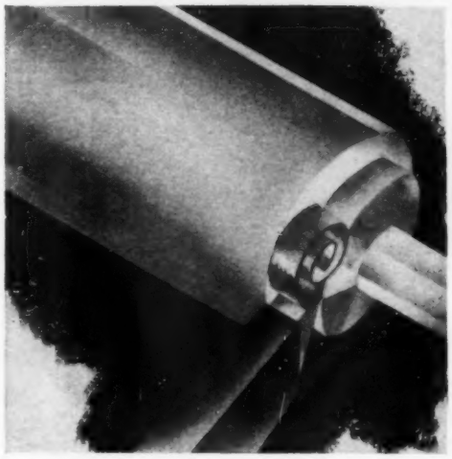
+SPEED CASE+ IS WORLD'S FASTEST MACHINING O.H. CASE HARDENING STEEL

for better machined parts with FEWER REJECTIONS



The use of TIMKEN Alloy Steel is associated with consistently low machining costs in many modern plants due to its uniform free-cutting qualities, cleanliness and freedom from internal defects.

No matter what the operating speeds may be nor how heavy the cuts taken you will find that TIMKEN Steel machines smoothly with good finish and minimum wastage.

Operating one of the largest machine shops in the country we know the importance of easy machining and what the steel user needs in this respect. May we discuss your requirements?

GOOD WILL BASED ON GOOD STEEL

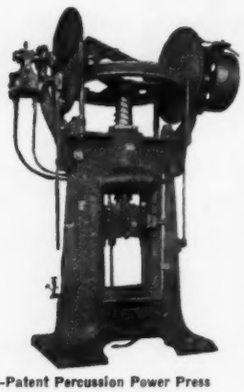
TIMKEN STEEL AND TUBE DIVISION

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

Manufacturers of Timken Tapered Roller Bearings for automobiles, motor trucks, railroad cars and locomotives and all kinds of industrial machinery, Timken Alloy Steels and Carbon and Alloy Seamless Tubing, and Timken Rock Bits.

TIMKEN *TAPERED ROLLER* BEARINGS

No. 2-3 Horn Press.



No. 16—Patent Percussion Power Press

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POWER PRESSES

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ZEH & HAHNEMANN CO.,

180 Vanderpool St.

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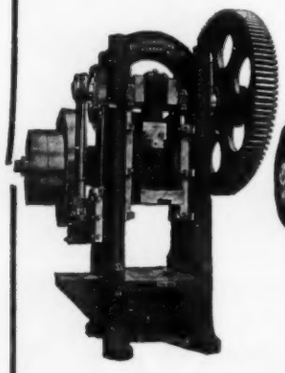
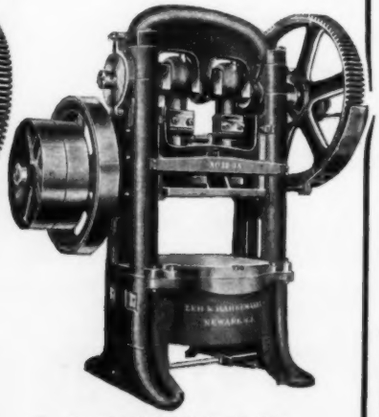
The entire Z & H Line is the result of more than thirty years specialized experience. It includes all types and sizes for metal and other materials. Each type has been developed to meet all requirements of modern power press practice — each is up to date in design and construction, with exclusive safety features.

We are prepared to prove the lower operating, labor and maintenance costs offered in Z & H Presses and demonstrate the savings you can make on your work.

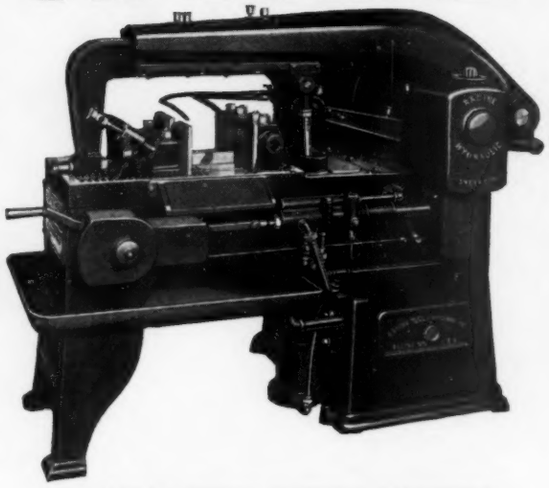


No. 9-16 Straight Side Press.



No. 12—0A Double Crank Press

RACINE



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The Modern Production Saw that is making new records in steel mills, warehouses and machine shops.

FULL HYDRAULIC CONTROL

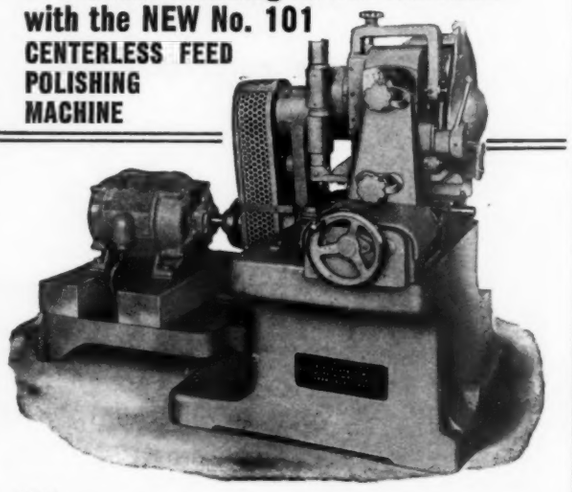
Dependable Performance at cutting rates never before obtained with reciprocating power saws. A complete line, 6x6" to 13x16".

"Standard the World Over"

RACINE TOOL & MACHINE COMPANY

1751 State St. Racine, Wisconsin

. . . better finishing at BIG SAVINGS with the NEW No. 101 CENTERLESS FEED POLISHING MACHINE



WORK may be fed with inexperienced labor and superior finish attained at highest feed speeds on this modern automatic feed polishing machine.

Particularly designed for polishing and buffing cylindrical work without the necessity of centering, chucking or holding, the No. 101 assures more and better work at lower costs.

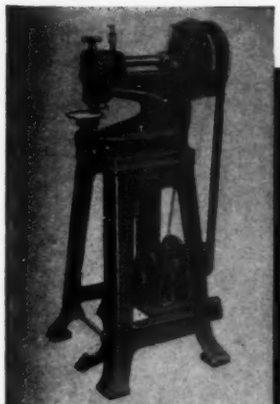
Complete detailed information is available on this new machine. Ask for a copy of our latest bulletin.

PRODUCTION MACHINE CO.

GREENFIELD, MASS.

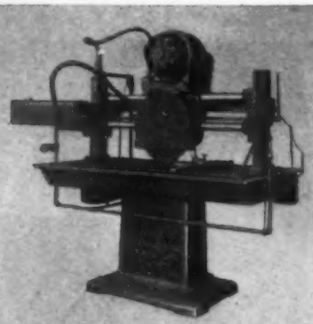
Grinding, Polishing and Finishing Machinery

SHEET STOCK • BAR STOCK • TUBING • PLATE



● CAMPBELL NIBBLING MACHINE

5 EASIER *and* CHEAPER WAYS TO CUT METAL *and* MATERIAL



● CAMPBELL MODEL 302 HORIZONTAL WET ABRASIVE CUT-OFF MACHINE

Each of these five Campbell Machines was designed to do a specific type of cutting better, faster and at lower cost than by other methods. Each will handle a wide variety of materials. If you have a material cutting problem, it will pay you well to investigate—the savings under certain conditions are astonishing.

Campbell Nibbling Machine. Nibbling is an inexpensive method of cutting odd shapes of ferrous and non-ferrous metals, plastic and other composition sheets. It cuts clean, without distortion or internal stress. Saves die cost on short runs.

Campbell Model 302 Horizontal Wet Abrasive Cut-Off Machine. Designed primarily for making long cuts through flat or slab materials. Will cut bar stock, glass, porcelain, brick, stone, hardened steel and alloys. Cuts clean and fast, without glazing. Hydraulic feed mechanism is self-adjusting within certain limits which assures proper wheel pressure.

Campbell CUTAMATIC Abrasive Cutting Machine. A new machine that abrasively cuts many materials automatically by a newly developed oscillating and rotating movement of the wheel. Leaves practically no burr. Eliminates burning, surface hardening or glazing. Cuts larger diameter materials than heretofore possible by the abrasive method.

Campbell Hudorkut Submerged Cutting Machine. All cutting is done with the work immersed in a coolant. Cuts so clean and smooth that usually no additional surface finishing is required. Semi-automatic in operation. Ideal for laboratory use where the highest quality of work is essential.

Campbell Model 203 Wet Abrasive Cut-Off Machine. Cuts almost any material in solid bar, tubing or irregular shapes. New and novel method of holding work and applying coolant assures cuts of uniform quality, increased safety of operation, elimination of dust, burning or surface hardening; reduces wheel cost and breakage.

for technical details regarding all Campbell Metal Cutting Machines—address:

ANDREW C. CAMPBELL DIVISION
AMERICAN CHAIN & CABLE CO., Inc.
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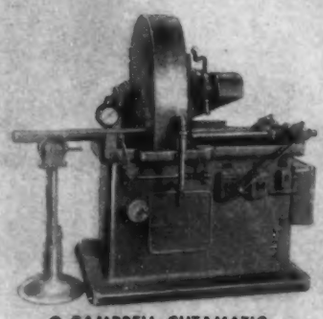
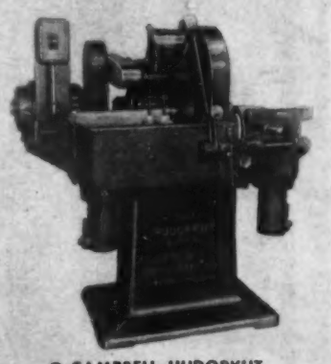
Designers and Builders of Special Machinery

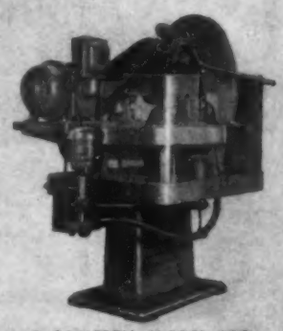
In Business for Your Safety



● CAMPBELL CUTAMATIC ABRASIVE CUTTING MACHINE



● CAMPBELL HUDORKUT SUBMERGED CUTTING MACHINE



● CAMPBELL MODEL 203 WET ABRASIVE CUT-OFF MACHINE

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(DOMINION CHAIN COMPANY, Ltd., in Canada)
Weed Tire Chains • Welded and Weldless Chain • Malleable Castings • Railroad Specialties

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CAMPBELL *Material Cutting* MACHINES

American Swiss

Files of Precision

"Only the BEST are good enough"

. . . IF YOU WANT YOUR MECHANICS TO DO BETTER WORK AT LOWER COST

THE better the tool, the better, the faster, a good man can work, and at lower ultimate cost.

These American-made Swiss Pattern files are equal, many say the SUPERIOR, of justly famous imported Swiss Pattern files. You simply cannot compare them with regular commercial products. Their finer workmanship means longer life for the file, better results by the user. They are made in more than 2000 shapes, cuts and sizes. Between 25 to 30 operations are necessary in their manufacture—that is one reason why they are never made to meet price competition, but to furnish the best results to men who know their value. Distributors and users both unite—in praising them. Names will be sent upon request. If you are in doubt as to the proper file to use for your work, write our "Problem Department" for sincere cooperation.

The same high quality of workmanship goes into our Mechanics Hand Tools and Hand and Machine Knurls.

AMERICAN SWISS FILE & TOOL CO.

Elizabeth, New Jersey

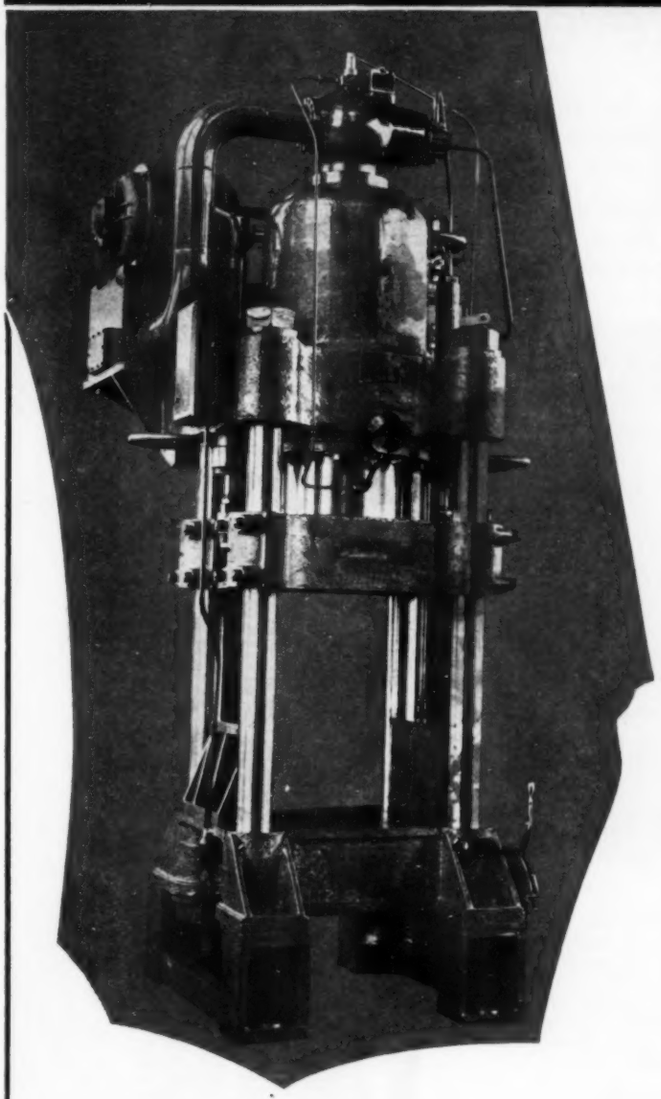
BUY FROM THE DISTRIBUTOR

The MARK of SUPER QUALITY

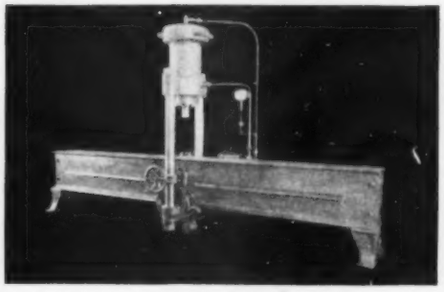
FILES TRADE — ONLY THE BEST ARE GOOD ENOUGH — TOOLS MARK

Swiss Pattern Files are the only type we manufacture

AGAIN IN 1937 - - IT'S WATSON-STILLMAN FOR HYDRAULIC MACHINERY & EQUIPMENT



400-Ton Reversed Cylinder Rapid Acting Press with self-contained power unit; operates at a speed of 9 cycles per minute; used for forming and straightening work.



125-Ton Straightening Press with self-contained power unit, single lever control.

An installation of 330-Ton Tilting Head Molding Presses.

85 YEARS SPECIALIZATION IN A SINGLE FIELD

The Watson-Stillman Company has been engaged in the development and manufacture of hydraulic machinery and allied lines since 1848. The items displayed and listed in this page, only part of our complete line, represent the best that perfect materials plus skilled workmanship can produce. For prices, specifications and detailed information, write for our catalogue.

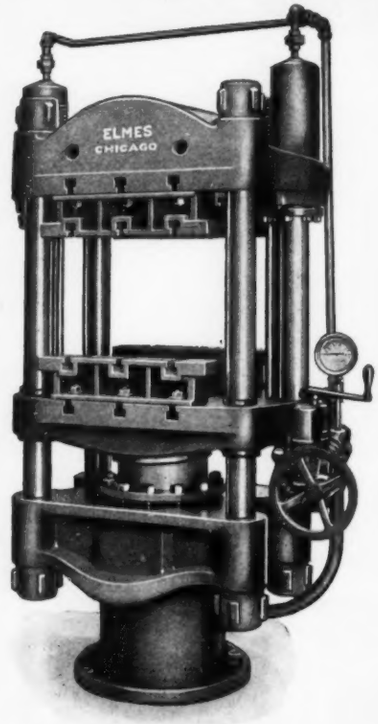
OUR COMPLETE LINE OF EQUIPMENT INCLUDES:

- Accumulators
- Pipe Benders
- Rail Benders
- Filters
- Gauges
- Leather Packings
- Valves and Fittings
- Pressure Pumps
- Shock Alleviators
- Straighteners
- Hydraulic Jacks

WATSON-STILLMAN COMPANY, Aldene Rd., ROSELLE, N. J.

HYDRAULIC MACHINERY
SINCE 1851
ELMES
CHICAGO

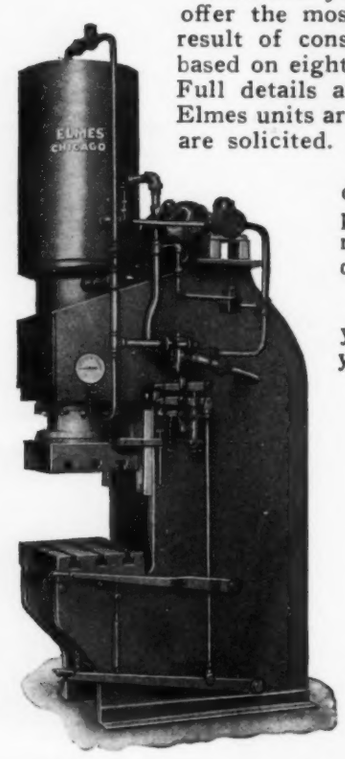
Whatever your problem



Whatever your problem, Elmes Hydraulic Presses offer the most advanced features of design—the result of constant development and improvement based on eighty-five years' experience in this field. Full details and descriptions of these and other Elmes units are yours for the asking. Comparisons are solicited.

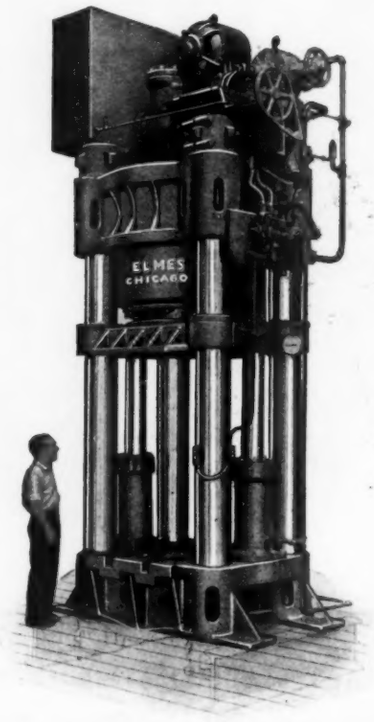
We are sure that Elmes features of design will sell themselves in lower production costs and reduced maintenance wherever forming, moulding, or bending operations are required.

Ask for complete catalog or outline your need and we will be glad to give you our recommendations.

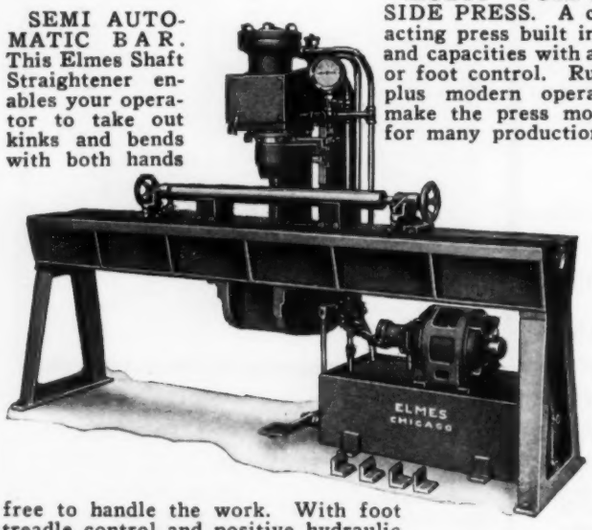


HYDRAULIC MOLDING PRESS Semi Automatic with high and low pressure operating valves—Combination Control of main and pushback cylinders. Two upper and two lower grids with the supports in each. Mechanical knockouts in top head with spring return.

MULTI - PURPOSE OPEN SIDE PRESS. A compact, rapid acting press built in several sizes and capacities with automatic hand or foot control. Rugged strength plus modern operating features make the press most economical for many production jobs.



SEMI AUTOMATIC BAR. This Elmes Shaft Straightener enables your operator to take out kinks and bends with both hands free to handle the work. With foot treadle control and positive hydraulic ram return this unit will handle work up to 3" dia. and 48" long.



HYDRAULIC FORMING PRESS offers exceptionally rigid design with two push up cylinders resting upon and securely bolted to the bed. Each cycle is automatically controlled and timed with automatic shutoff of large pump when pressure is held on work. The Elmes line includes a forming press exactly suited to your need.

THE CHARLES F. **1001-1013 Fulton St.** HYDRAULIC MACHINERY SINCE 1851 ELMES CHICAGO *ENGINEERING WORKS* **Chicago, U. S. A.**

MARVEL SAWS

• • a complete line

No. 1 Hack Saw 4"x4" Capacity. General Utility. Dry Cutting. Spring Pressure Feed. Single Speed.

No. 2 Hack Saw Adjustable Stroke. 6"x6" Capacity on long stroke. Spring Pressure Feed. Single Speed.

No. 4B Hack Saw High Speed. Moderate Duty. Plain Bearing. 6" x6" Capacity. Friction Screw Feed. Single, 2-speed, or 4-speed.

Blades Non-Breakable. Patented Hack Saw Blades. High Speed Steel Teeth. Alloy Steel Back. For all types of hack sawing machines and hand frames.

Metal Sawing

A Complete Technical Service

No. 6 Hack Saw All-Ball-Bearing. Heavy Duty. High Speed. 6" x 6" Capacity. Combination Positive-and-Friction Screw Feeds. Single speed or 4-speed.

MARVEL offers a complete SYSTEM for metal sawing with a complete line of modern equipment, all the way from the cutting blade itself to all the various sawing machines that are particularly adapted to individual sawing jobs.

MARVEL sales engineers are available in all the large industrial centers and are equipped to render complete consulting engineering service on all cutting-off problems.

The MARVEL line comprises:

Non-Breakable High Speed Hack Saw Blades.

A "giant" Hydraulic Hack Saw of 18" x 18" capacity. (The world's largest hack sawing machine.)

Fully Automatic Production Hack Sawing Machines in two sizes equipped with either normal service automatic bar push-up or with special "heavy duty" automatic bar push-up for extremely heavy work.

All-ball-bearing Heavy Duty High Speed Hack Sawing Machines.

Dry cutting, general utility Shop Saws, at extremely low prices.

The largest capacity universal metal cutting **Band Saw Machine.**

Also, new, novel **Hand Hack Saw Frames,** and non-breakable high speed hand hack saw blades for heavy-duty production work.

If you use metals in bar or billet form, ask us to send our local sawing engineer to call on you to analyze your work and to make recommendation to you of a complete sawing-equipment and methods program to fit your particular range of work and production requirements. No obligation, no cost to you.

No. 6A Hack Saw Full Automatic Bar Feed. 6"x6" Capacity. Combination Positive-and-Friction Screw Feeds. Single speed or 4-speed.

No. 9 Hack Saw All-Ball-Bearing. Heavy Duty. High Speed. 10" x10" Capacity. Combination Positive-and-Friction Screw Feeds. Single speed or 4-speed.

No. 18 Hack Saw "The World's Giant." Capacity 18" x 18" Hydraulic Feed. All-Ball-Bearing. "Roll-stroke" blade action. Swivels to any angle.

No. 8 Band Saw Universal Band Saw. Capacity 18"x18". Power Feed to Carriage Tilts to cut all angles.

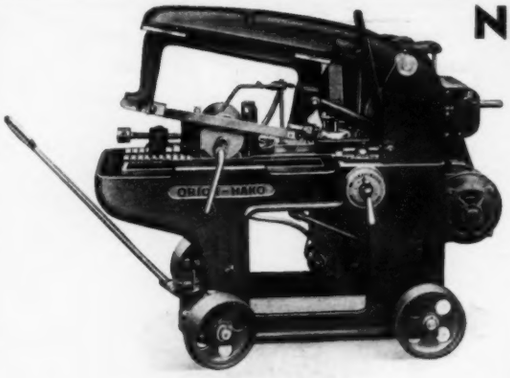
No. 9A Hack Saw Full Automatic Bar Feed. 10" x 10" Capacity. Combination Positive-and-Friction Screw Feeds. Single speed or 4-speed.

MARVEL

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

CHICAGO U. S. A.



NEW HYDRAULIC POWER HACKSAW

The *ONLY* hydraulically controlled Power-Saw with exclusive Single Lever Control for Feed, Pressure and *ALL* Frame Movements.

Entire Sawing Cycle fully automatic and oil-cushioned resulting in maximum cutting efficiency and long life of saw blades.

Hydraulic Control and Precision Finish guarantees permanently fool-proof, smooth and vibrationless operation.

Stationary and portable models in 5 sizes:
6″ 8″ 10″ 12″ 16″ Capacity

Ask for catalogs and prices.

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MULTIPLE HEADS

Super-Sensitive Fixed-Center Multiple Drilling Heads

Fixed-Center Auto-Reverse Multiple Tapping Heads

Light-Weight, Super-Sensitive, Durable and Quick-Handling for High Speed Production of Interchangeable Parts.

"Many Holes at Cost of One."

Quick-Change Drilling and Tapping on Reversible Drill Press.

THE STANDARD "SOFT" HAMMERS of INDUSTRY

. . . preferred for the smooth, 1-piece heads, their power, balance and striking accuracy . . . *preferred* for their tougher (compressed water buffalo hide) inserted faces that hold their smooth surface, last far longer and are easily replaced. Standard in the greatest plants for die-setting, assembling and maintenance these Superior "soft" hammers come in many weights and sizes, with coiled Rawhide Mallets for light work and mighty Mauls for the heaviest.

Chicago Rawhide Mfg. Co.
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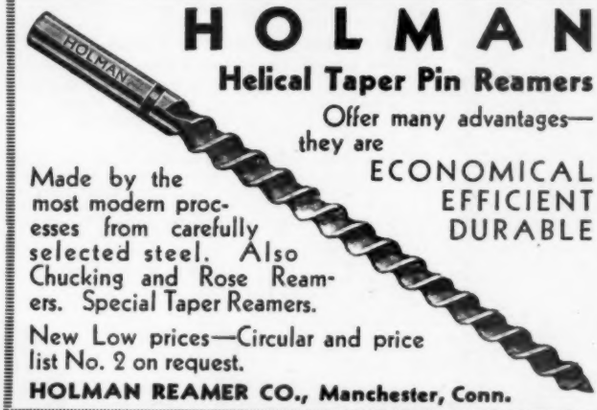
Chicago Rawhide Hammers

HOLMAN

Helical Taper Pin Reamers



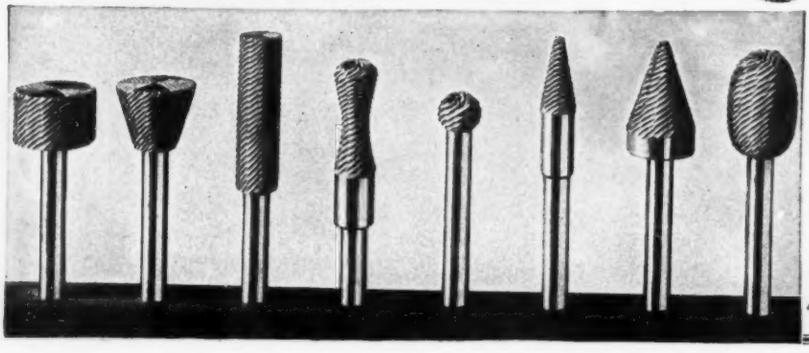
Offer many advantages—they are
ECONOMICAL
EFFICIENT
DURABLE

Made by the most modern processes from carefully selected steel. Also Chucking and Rose Reamers. Special Taper Reamers.

New Low prices—Circular and price list No. 2 on request.

HOLMAN REAMER CO., Manchester, Conn.

There is a FORD ROTARY FILE or RASP for the job—whether it's ROUGH or DELICATE WORK



FAST CUTTING
LONG LIFE
HIGH GRADE WORK

Regardless of the job—rough or delicate—Ford Rotary Files and Rasps fill the need. They are standard equipment in all types of industry throughout the world. Made of high grade material, turned accurately to size, cut by hand and hardened by our own special heat treating process and fully guaranteed. We can supply a number of standard shapes and sizes from stock and will be glad to work with you in recommending and devising new and proper types for your particular work.

Bulletin 105 shows our complete line—Send for it.

M. A. FORD MFG. CO.

406 PERSHING AVE., DAVENPORT, IA.

NEW TOOLS FOR A NEW ERA

• Delta "Low-Cost" Tools Reduce Operating Costs

In factories large and small, home workshops, schools—Delta motor-driven tools are the tools of the new era. In home shops, they offer the craftsman production accuracy, convenience, and quality at prices well within his reach. In industrial shops, they offer decreased production costs, increased flexibility and efficiency, at a fraction of the cost of the old heavy machines. Delta Tools were developed and built in "depression" times. Today, in tens of thousands of shops all over the world, they are the symbol of a new era in industry and craftsmanship.

• New 17-Inch Delta Drill Press

It is difficult to describe even briefly the chief features of this revolutionary new drill press. Five Speeds, Double Sealed "lubricated for life" Ball Bearings, Special Inverted Spline Spindle, Special Quill, Large Tilting Table, New Type Foot Power Feed—these are but a few of the scores of features that make this new Delta Drill Press a triumph in tool engineering. Yes—the price is low, unbelievably low for a tool of this size, weight, and quality.

• Complete Line of Slo-Speed Drill Presses

The Delta Triple Duty Drill Press line includes both High Speed and Slo-Speed machines, floor type and bench type, single and multi-spindle models, all priced so low and built so well that users continuously marvel at the value they offer. If you want to know the real story of the remarkable performance of Delta Drill presses, ask the men who use them.

• New Improved Line of Grinders

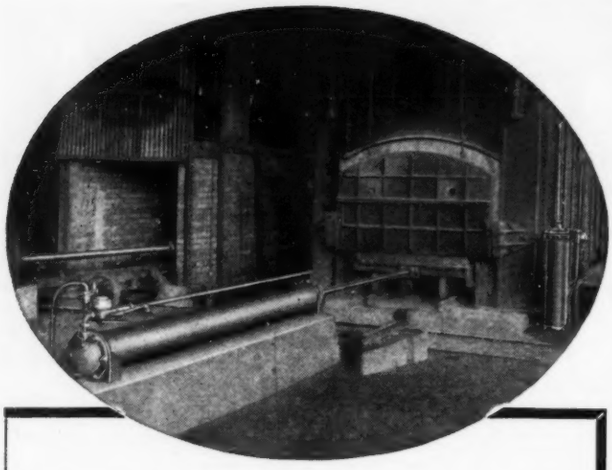
Not just another line of grinders, but new grinders advanced, revolutionary, offering many features never before offered in any grinders at any price. The new Twin-Lite Safety Shields and the accurate wheels balanced to 1/100th of inch-ounce are but two of the many improvements that make these grinders of interest to every shop manager.

• Full Line of Woodworking Tools

The complete Delta line includes Shapers, Sanders, Band Saws, Scroll Saws, Grinders, Circular Saws, Drill Presses, Mortisers, Routers, Lathes, and a full line of accessories and attachments. Write today for the name of the nearest Delta Dealer and for catalog describing the entire line of Delta Quality Tools. Address your inquiry to the Industrial Tool Division.

DELTA MFG. CO.

600 E. Vienna Ave. **Milwaukee, Wis.**



CURTIS AIR CYLINDERS

do it cheaper

Most PUSH, PULL, or LIFT operations can be done more economically with Curtis Air Cylinders. Hundreds of plants have effected important savings by using Curtis Air Power for jobs formerly done by hand or other types of mechanical equipment.

Curtis Air Cylinders or Hoists are inexpensive and easy to install. The power cost is low, and upkeep is negligible. Interruptions are extremely rare. Easy and accurate control is provided by packless rotating disc valves. Curtis Air Cylinders are immune to injury from overload and are not harmed by bad atmospheric conditions.

Curtis can add to your profits by increasing plant efficiency. Write for facts and figures on remarkable savings made by typical Curtis installations.

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COMPRESSORS • AIR HOISTS
I-BEAM CRANES AND TROLLEYS

IT CAN'T BE BEAT

—for *real* service!

Vacuums—
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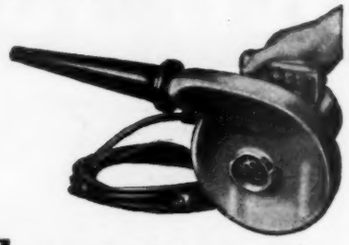

The IDEAL "3-in-1" Electric Cleaner

Powerful 1 H.P. Motor
Air Velocity 24,200 Ft.-Min.
Vacuum Water Lift 46¼"
A 7½' Diameter Fan
Oilless Ball Bearings.

This high-powered hard worker will labor side by side with you in *getting* that dirt, grindings, sawdust, lint, etc., *out* of every crack, corner, and crevice! Keeps machinery, motors, generators, etc. CLEAN — thus enabling them to work at top efficiency. Prolongs machinery life considerably. Compact, convenient, *portable!*

Give *YOUR* plant the benefit of its super service!

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IDEAL COMMUTATOR DRESSER COMPANY
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OPTICAL DIVIDING HEAD

For machining or checking circular spacing to extreme accuracy

Also suitable as Optical Rotary Table on Jig Borers and Vertical Millers. See Illustration. Indexing from permanently accurate optical dial, not through worm and gear. Request Catalog Fel08c.

GEORGE SCHERR CO.
124 LAFAYETTE ST., NEW YORK

what's *new* about hoists?

find out by getting a copy of the new WRIGHT HOIST CATALOG

● Just about every bit of information you would want to know about chain hoists or hand operated hoisting equipment is given in the new Wright Hoist Catalog—a book packed with hoisting facts and loading data.

When you get your copy of this new Catalog, check the Wright 21 Points. Compare them with hoists you are using—or any other hoists. Examine the engineering section—Pages 80 to 84 inclusive—a reliable encyclopedia on permissible loads under various conditions and requirements.

Every factory manager, superintendent and foreman will find much useful information and data about choosing, operating and maintaining hoists in the new Wright Catalog. Send for it—you'll receive your copy at once.

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YORK, PENNSYLVANIA
AMERICAN CHAIN & CABLE COMPANY, Inc.
In Business for Your Safety

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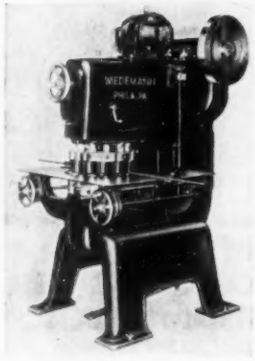
ACCO

WRIGHT *Improved High Speed* HOISTS

TURRET PUNCHES

RANGING FROM 8 TO 32 STATIONS
HAND OR POWER OPERATED

The two smallest sizes hand operated only, others power operated

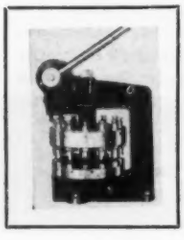


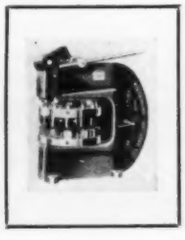
Type R-5 Turret Punch equipped with steel plate work table graduated rear work gauge and complete set of dies for punching knock-outs in conduit boxes.

The modern turret punch is a wide range, time and money saving machine, with instantly available punches mounted on a revolving turret. It is built in hand-operated sizes for light work and in rugged motor driven models for heavy duty. It is a productive machine always and an extremely accurate machine when close tolerances are desired. For example, with special punches developed for the purpose it is now possible to punch copper, aluminum, stainless steel and duralumin. Many manufacturers are using them successfully on such work as copper bus bars, for thin materials where large openings are to be pierced, and for forming and embossing. Turrets are usually built for 12 punches, but can be made with more or fewer stations for special purposes. We'll gladly send complete details.

WIEDEMANN MACHINE COMPANY

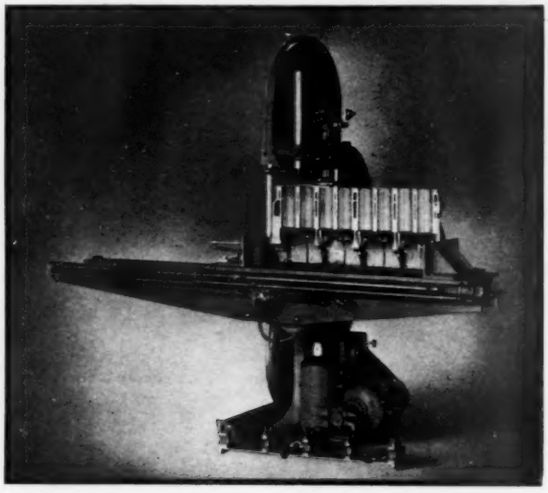
1815-31 Sedgley Ave. Philadelphia, Pa.





LAIDLAW TYPE JM-30

WITH HYDRAULIC FEED



CAPACITY 19" x 40"

●

Designed to prevent any possibility of building up undue pressure on the saw, yet providing sufficient power always to maintain constant contact with the work. This new feature assures continuous production with a minimum of blade replacement. Wide speed ranges provided to suit all kinds of metal.

Buick and Ford Motor Car Companys uses them to cut cylinder blocks in half for regular inspections. Requires only a few minutes compared with hours before.

As builders of Metal Cutting Band Saw exclusively, we offer a full line of machines for all classes of work. If you will indicate what job you have to do, we will send complete specifications on the machine best suited to your needs. We manufacture twenty-two different types and sizes with a speed range of twenty-five to three thousand feet per minute saw travel and speed changes from two to thirty-two.

●

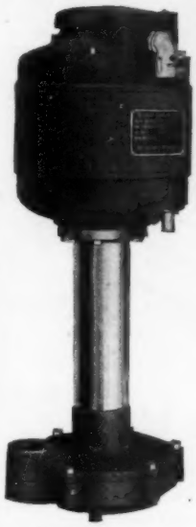
WILLIAM LAIDLAW, INC.

BELMONT, NEW YORK

90 LEADING MACHINE TOOL BUILDERS SPECIFY RUTHMAN GUSHERS BECAUSE

for ONE *thing* . . .

SIMPLICITY MARKS THEIR CONSTRUCTION



MODEL T.L.

• The fewer parts to a machine, the longer, more efficient its service.

Ruthman Gusher Coolant Pumps are the essence of simplicity! Vertical construction requires no packing nuts or equivalents, eliminating need for adjustments, repackings, etc., and reducing friction. No foot or relief valves are needed yet GUSHERS are leakproof. Send for data sheets to get complete story.

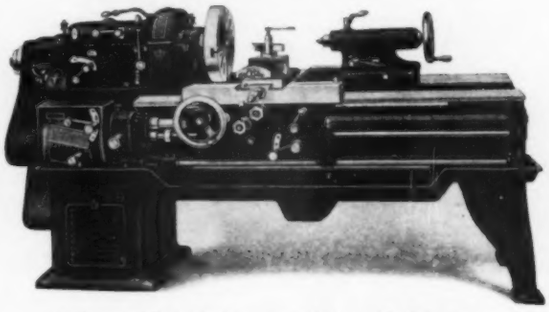
Consider a few more of our "19 REASONS WHY"

• Split-second starting. • No metal-to-metal contacts. • No strainers necessary. • Can be throttled without building up pressure. • Larger ball bearings. • Compact design. • Full year's unconditional guarantee.

THE RUTHMAN MACHINERY CO.
CINCINNATI, OHIO
"Standard and Special Pumps for Every Job!"

Speed and PRECISION Assured with CINCINNATI LATHES

The latest Cincinnati designed to provide both speed and precision in the production of quality work, are the result of over 30 years specialization. They are produced by skilled workmen from the finest materials made, and guaranteed to bore true within .001 of an inch.



14" to 32" inclusive, complete with bronze or anti-friction bearings; also automatic lubrication. To them we fit any standard or special attachments to meet your specific requirements. Whether in tool room or manufacturing plants the Cincinnati gives most remarkable performance. You too will find them the most economical to install. Send for latest complete catalog.

THE CINCINNATI LATHE & TOOL CO.
Oakley, Cincinnati, Ohio, U.S.A.

Small Stampings at Small Cost

PERKINS JUNIOR INCLINABLE PRESS with A.C. Motor complete

. . . will make a quick return on small investment . . . flat punching ¾" dia., 1/16" thick blank at 550 r.p.m. Special alloy steels used throughout. Write today, for complete specifications and price.

Speed up production and reduce cost with this Powerful Power Press. 2" diameter shaft at body bearings.

PERKINS MACHINE COMPANY
2 PERKINS AVENUE
WARREN MASSACHUSETTS

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You have a tough cleaning problem . . . and what shop hasn't? One that has been troubling you for some time. Isn't it worth the price of a postage stamp to get the answer?

The Oakite organization has been helping industry solve difficult cleaning operations for over 27 years. It now is serving over 15,000 concerns . . . helping them obtain better, faster, more economical cleaning. We already KNOW the answer to your problem. Or our Technical Research Laboratories soon will find it for you.

Write. We can help you. No obligation.

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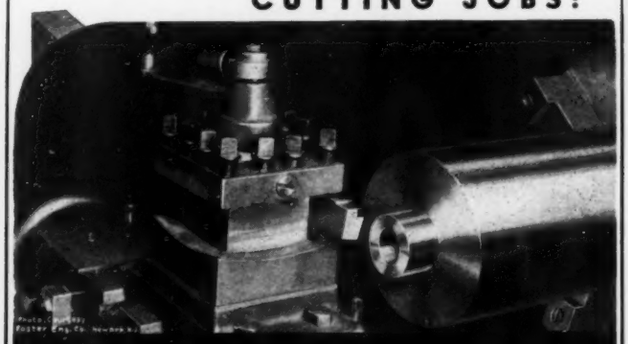
Since 1909 *the* STANDARD *of* Cleaning Quality

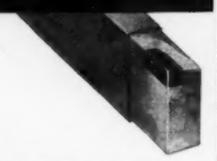
OAKITE

SPECIALIZED INDUSTRIAL CLEANING MATERIALS & METHODS

THIS TOOL MASTERS
THE *Toughest Steel*
CUTTING JOBS!



OPERATION: Turning Steel Shaft (6" Dia.) MATERIAL: 6150 Heat Treated Steel
CONTINUOUS PRODUCTION: 55 Hours Without Grinding
SPINDLE SPEED: 169 R.P.M.: F.P.M.: 265 FEED: .020 DEPTH OF CUT: 7/16"-1/2"



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OFFERS . . .

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3. *AT NEW LOW PRICES*

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SUPERIOR CARBIDE CUTTING METAL

Tungsten Electric Corp.
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A
New Gauge

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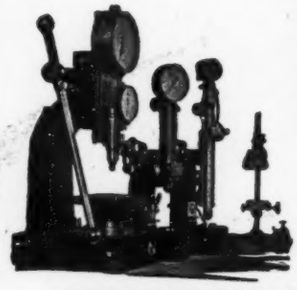
AMES Shockless Gauge
B. C. AMES CO.
Waltham, Massachusetts

HARDNESS TESTING
Should Be Made With Up-to-date Equipment—You cannot afford to experiment



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are accurate, reliable and built to stand the gaff of hard usage.

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The new Van Norman No. 22 Universal Miller, completely equipped with G-E motors and control

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Equipped With Modern Electric Controls . . .

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LOOK at this new machine tool and then take a look at "Old Faithful"—that veteran machine-tool that has given you such satisfactory service.

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Make Three Inventories THIS YEAR!

1. **Inventory the machine tools you are now using**
2. **Inventory the progress made by machine-tool builders since your machines were purchased**
3. **Inventory the progress made by General Electric in improving electric equipment to meet present-day demands**

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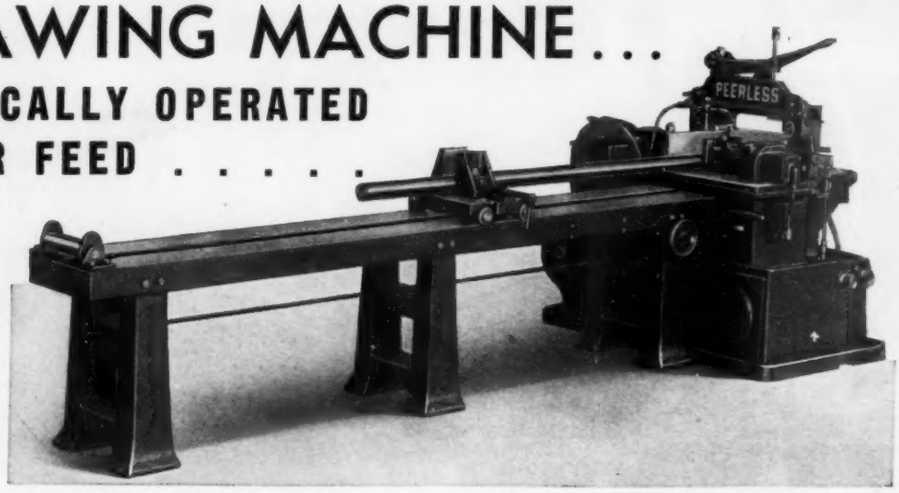
METAL SAWING MACHINE...

WITH HYDRAULICALLY OPERATED AUTOMATIC BAR FEED . . . . .



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PEERLESS MACHINE COMPANY

RACINE WISCONSIN

HOTTEST and QUICKEST **BUZZER** WITHOUT A BLOWER

REG. U. S. PATENT OFFICE

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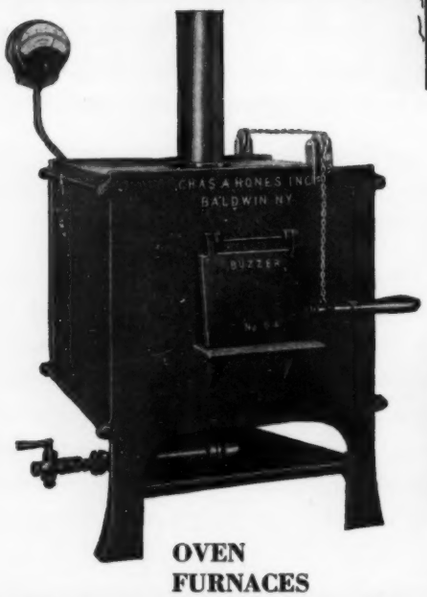

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Give 1800 degrees in an hour. Heat is retained in fire box where it belongs. Substantially constructed. Heavily insulated with modern insulating fire brick. Non-wobbling 3-legged mounting. Simply connect to gas supply. Equipped with Venturi Air Mixer which gives wide range of control by single gas cock. No blower gas booster or other auxiliary equipment required. Three standard sizes. Write for literature.

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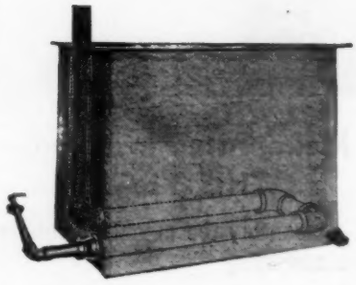
BUZZER Immersion Heater Burners are used in hundreds of industrial plants for heating tanks containing liquids, oils, greases, asphalt, salt-tempering baths, etc. Efficiencies range from 70 to 80%, as compared with the usual 40 to 50% for underfired tanks. BUZZER IMMERSION HEATER BURNERS require no blower, and have a wide range of turn down without danger of flashing back—thereby permitting automatic control if desired. Made in eight sizes. Bulletin on request.



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For dependable service, long life, and high efficiency, we recommend this compact little furnace — especially for rapid melting of aluminum, cyanide, and lead hardening. No blower or power necessary. Just connect to your gas supply. Lined with high temperature insulating fire brick. Heats quickly up to high temperature — retains heat with minimum loss. Available in two sizes. Write for details and prices.

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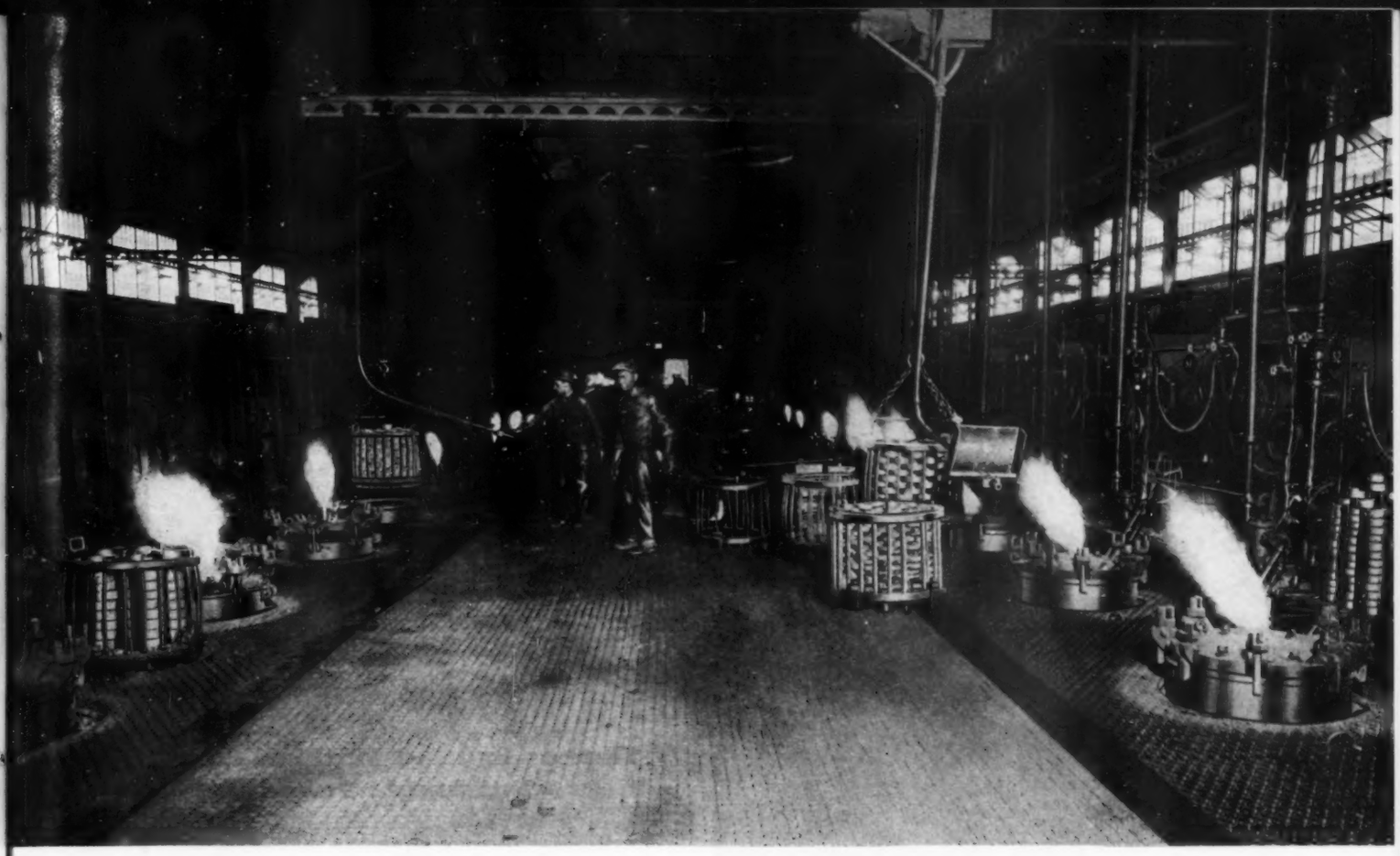

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American Gas Furnace Co.

Elizabeth, New Jersey

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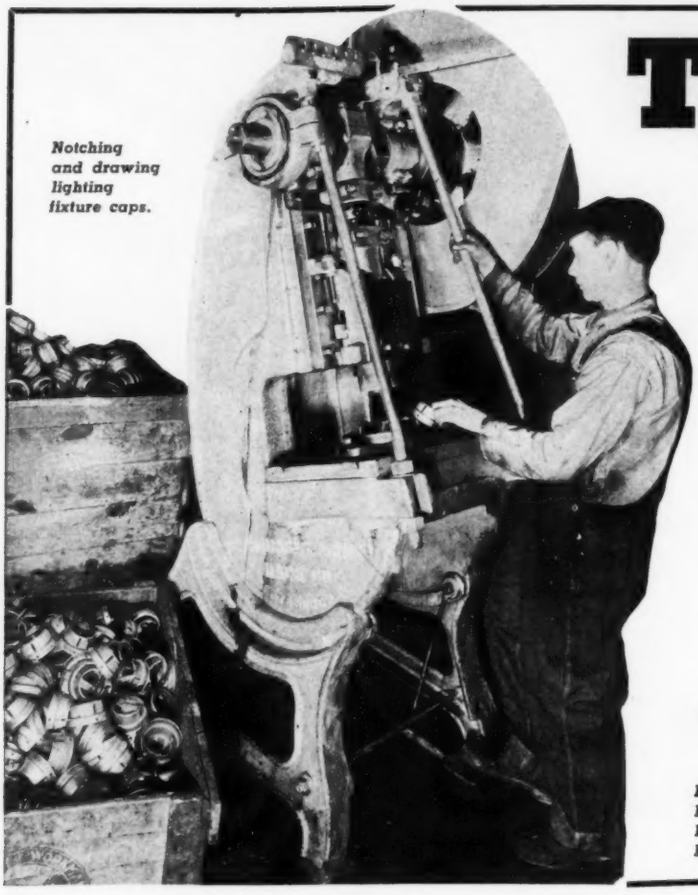

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Ask about the Non-Repeatable Clutch and other Safety and High Production Features—And get Bulletin 112 for your file.

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Builders of the Thomas Spacing Tables and Multiple Punches, Angle Planers, Angle Bevelers, One-Man Tables, Pantograph Tables, Rack Tables and Standard Line of Punching and Shearing Machinery.

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STOPS LOSSES

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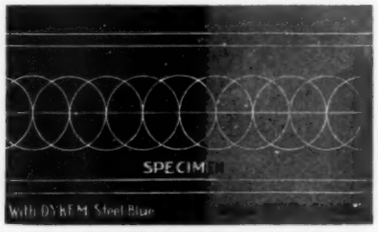

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"ROCKWELL" HARDNESS TESTER

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SAFETY EQUIPMENT for Power Presses

SINGLE-STROKE ATTACHMENTS
SWEEP-GUARDS • TWO-HANDED DEVICES

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WHERE-TO-BUY USED MACHINE TOOLS AND SHOP EQUIPMENT

The numbers appearing under a classification indentify advertisers so numbered in the Alphabetical Index.

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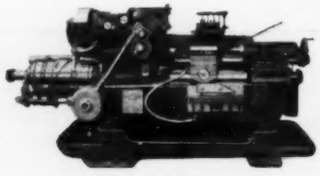
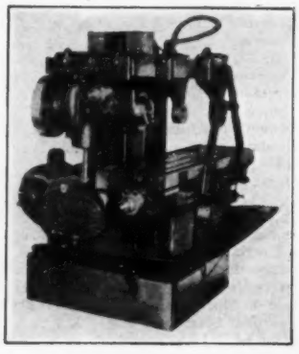
HIGH GRADE - - LATE TYPE
USED PRODUCTION EQUIPMENT
for immediate delivery



LATHES

14"x19" Fay Automatic
14"x33" Fay Automatic
No. 17 Barnes Automatic
6¼"x15" Model R LoSwing
4"x15" LoSwing, hardened ways
4"x36" LoSwing, hardened ways
8" Sundstrand Stub
12" Sundstrand Stub
No. 1-A Warner & Swasey
No. 1-F Foster Fastermatic
No. 4-D Potter & Johnston
Gisholt Simplimatics
30" Gisholt Automatics
LeBlond Multi-Cut, all sizes
No. 4-D Potter & Johnston Automatic
No. 6-DP Potter & Johnston Automatic
Wickes and LeBlond Crankshaft



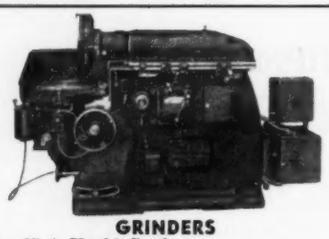
MILLING MACHINES

No. 3 Sundstrand Rigidmills
No. 31-B DeVlieg Supermil
No. 40 Sundstrand Duplex Hydraulic
No. 4-48" Cincinnati Hydromatic with vertical head
No. 4-36" Cincinnati Duplex Hydromatic
Cincinnati Automatic Duplex—all sizes
Cincinnati Single Head Automatics—all sizes
Newton Continuous
Ingersoll Rise and Fall
Ingersoll Planer Type
No. 1 Davis Continuous
Newton Drum Type
No. 10 and No. 45 Producto-Matic
No. 2 Kent Owens Hand Mills
Also full range of sizes in plain, universal and vertical

FORGING MACHINES

7" Ajax Upsetter, steel bed
4" Ajax Upsetter, steel bed
3" Ajax Upsetters, steel bed
2" Ajax Upsetters, steel bed
2½" Ajax Heavy Duty Upsetter
1" Ajax Upsetter, steel bed
5" National Heavy Pattern
4" National Heavy Pattern

Limited space does not permit the listing of our entire stock, but to acquaint you with the equipment we have, we offer this representative selection.
For the coming year may we suggest that you consider our stock as a dependable source of supply.

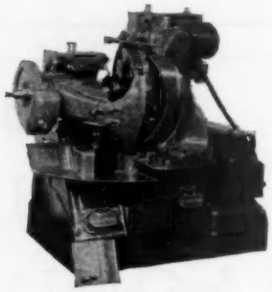


GRINDERS

No. 25-A Heald Surface
8" Pratt & Whitney Rotary
No. 12-A Bryant Internal & External
No. 72-A-3 Heald Size-Matic
No. 72-A-3 Heald Gage-Matic
No. 72 Heald Size-Matic
No. 12 Greenfield "Hydroil"
No. 2 Cincinnati Centerless
14" Model B Pratt & Whitney Surface
No. 16 Blanchard 30" chuck
No. 16-A Blanchard Automatic
Norton, Landis, Cincinnati Plain Cylindrical
No. 1-F Norton Lapping Machines

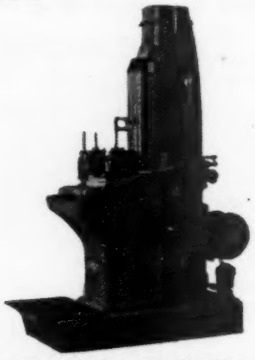
DRILLS

Natco Horizontal Hydraulic Duplex Multiple
Ingersoll Hydraulic Duplex Multiple
Fox 3-Way Horizontal Hydraulic
No. 450 W. F. & J. Barnes Horizontal Drilling and Tapping
No. 430 W. F. & J Barnes Horizontal Drilling and Tapping
Kingsbury Drilling and Tapping (various combinations and sizes)
No. 920 Barnes Vertical Hydraulic
No. 50-H Baker Vertical Hydraulic
No. 25-H Baker Vertical Hydraulic
No. 624 Baker 6-Spindle Vertical
Natco Multiple Drills—all sizes
Baush Multiple Drills—all sizes
Fox Multiple Drills
21" and 24" Cincinnati Upright with tapping
No. 217, 310, 314, 315, 321, 422, and 513 Baker Heavy Duty Drills
Colburn D-2, D-4, D-5, and D-6
Foote-Burt No. 23, 24, and 25 High Duty
No. 10-D Moline Cylinder Borers
No. 214 Barnes 8-spdl. Honer



GEAR MACHINES

10" and 15" Gleason Spiral Bevel Gear Generators
15" Gleason Spiral Bevel Roughers
18" Gleason Testing and Lapping Machines
Gleason Spiral Bevel Pinion Roughers
No. 12 Barber Colman double overarm
No. 12 Barber Colman Spline Hobbers
No. 3 Barber Colman Hobbers
16" Cincinnati Gear Hobber
No. 5-A Lees Bradner Generators
No. 5-AC Lees Bradner Generators
No. 2 Lees Bradner Manufacturing Generators
No. 1 Lees Bradner Production Hobber
No. 4, 6, and 8 Lees Bradner Thread Mills
12" Cincinnati Gear Burnisher
Cross Tooth Rounder
No. 36BM Gould & Eberhardt Rougher
No. 75 Fellows Gear Shapers
No. 16-HS Gould & Eberhardt Mfg. Hobbers



BROACHING MACHINES

No. 1 Foote-Burt Hydraulic Surface Broach
No. 4 Type XA Oilgear
No. 3 Oilgear
No. XB-10 Oilgear Twin
No. 3-HY American Hydraulic
No. 2-L J. N. LaPointe Hydraulic
V-50 American Vertical

VERTICAL MACHINES

14" Bullard Multi-Au-Matics
Bullard Contin-U-Matics

CHUCKERS

6-Spindle Baird
8" 4-Spdl. Model M Cleveland
4½" 4-Spdl. Model M Cleveland
4" 4-Spdl. Model M Cleveland
No. 454 New Britain "New-Matic"

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As a further step forward we are prepared to test under power any machine **REMADE** by us.

It is no longer necessary for the buyer to guess, as we can duplicate actual working conditions. Our guarantee? The same as given by the original maker when the machine was new.

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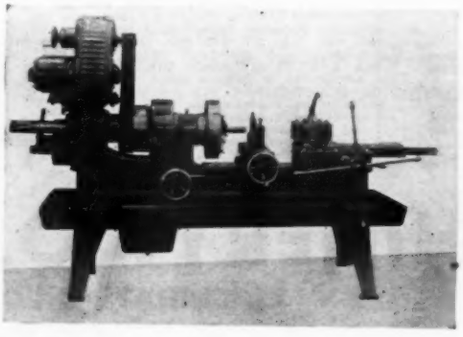

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"View of section of machine shop"

MILLING MACHINES

No. 4 Cincinnati Vertical, feed in knee, Timken Bearings, latest type
No. 8 Becker Vertical, cone
No. 4B Becker Vertical, m.d.
No. 2A Brown & Sharpe Universal, m.d., taper spindle
No. 3A Heavy, 4A Heavy Brown & Sharpe Universal m.d.
No. 2 Brown & Sharpe Universal, cone
No. 4 Cincinnati Plain, s.p.d., flanged spindle
Nos. 1, 1½, 2, 3, 4 Cincinnati Plain, cone
Nos. 1B, 3B Milwaukee Plain, m.d.
Nos. 1, 3 Kempsmith Plain, cone
Nos. 2, 2H LeBlond Plain, cone
No. 13B Brown & Sharpe Plain, s.p.d., National Standard Spindle
No. 13B Brown & Sharpe Plain, s.p.d., taper spindle
48" Oesterlein Tilted Offset, m.d., National Standard Spindle, Timken Bearings, brand new
No. 33 Kempsmith Production, s.p.d.
18", 24", 48" Cincinnati Plain Automatic, s.p.d.
24" Cincinnati Plain Automatic, National Standard Spindle, m.d.
48" Cincinnati Plain Automatic, worm drive, m.d.
24" Cincinnati Duplex Automatic, m.d.
6x14", 6x80" Pratt & Whitney Thread Millers, belt

BORING MILLS

24" Bullard New Era, m.d., side head, late (6)
30", 36" Gisholt Vertical, m.d.
36" Colburn Vertical, gear box
36", 42" Bullard Rapid Production, belt
37" Niles Vertical, m.d.
40" King Vertical, 2 heads, m.d.
54" Niles Vertical, 2 heads, m.d.

MISCELLANEOUS

20' Bending Rolls, cap. 1" plate
90" Bending Rolls, cap. 3/16" plate
No. 0—62" Hilles & Jones Plate Straightening Rolls, m.d., 3/16" cap.
No. 4120 Stoll Power Squaring Shear, cap. 10'—3/16"
½" Landis 2 spindle Bolt Cutter, belt
⅜" Acme 2 spindle Bolt Cutter, belt
6 spindle 1" Acme Semi-Automatic Nut Tapper, belt
No. 3B J. N. LaPointe Broach, m.d.
No. 2, 2 double, 3, 3 double J. N. La Pointe Broaches, belt
100 Bates Hammer, m.d.
250 lb. Little Giant Hammer, belt
Nos. 1, 2, 2X, 2BG Garvin Automatic Tappers, belt
14x14" Bury Air Compressors, plate valves, m.d.

GRINDERS

No. 72A5 Heald Plain Internal Grinder, hydraulic feed, 2 motor drive
No. 70 Heald Internal Grinder, belt
Nos. 50, 55, 60, 65 Heald Cylinder Grinders
No. 218 Besley Ball Bearing Disc Grinder, m.d., latest type
No. 25 Heald Rotary Surface Grinder, m.d., hydraulic feed
No. 78 Wilmarth & Morman Auto. Surface Grinder, m.d. in base
Nos. 1½, 4 Landis Universal Grinders, belt
12x36" Cincinnati Universal Grinder, 3 motor drive
No. 3 Brown & Sharpe Universal Grinder, belt
6x18", 10x24", 10x36", 10x52", 10x72", 12x72", 16x32", 16x52", 16x72" Landis Plain Self-Contained Cylindrical Grinders, m.d.
10x72" Norton Plain Cylindrical Grinder, 2 motor drive

GEAR MACHINERY

10" Pratt & Whitney Hydraulic Gear Grinders, 3 motor drive, with A.C. motors, for spur and helical gears
No. 7 Fellows High Speed Gear Shapers, motor drive, like new
No. 12 Barber-Colman Gear Hobbers, double overarm
No. 3, 12 Barber-Colman Gear Hobbers, single overarm
No. 5A Lees-Bradner Gear Generator, 19" size
No. 18H Gould & Eberhardt Gear Hobber
6", 11", 18" Gleason Gear Generators
Nos. 6, 61, 612 Fellows Gear Shapers, belt

ENGINE LATHES

60"x48' Niles-Bement-Pond, 2 carriages, like new
36"x18' LeBlond Geared Head
36"x18' American, cone head, taper
30"x36' Lodge & Shipley Heavy Duty Forge Drilling Lathe, motor drive
30"x14' Lodge & Shipley, cone
28—57"x12' Putnam Extension Gap, belt
24"x12' Lodge & Shipley, cone taper
24"x10' Greaves-Klusman, cone
21"x10' LeBlond Geared Head, taper
20"x10' Monarch Geared Head Gap, taper
20"x10' Hendey Geared Head, taper
18"x 8' Hendey Yoke Head
16"x 8' Lodge & Shipley Selective Head
16"x 6' Lodge & Shipley cone head

TURRET LATHES, MFG. LATHES

Nos. 2A, 3A Warner & Swasey Universal, m.d.
Nos. 2, 4, 6, 8 Warner & Swasey, friction head
No. 4 Warner & Swasey Universal, friction head
3x36" Jones & Lamson 2 spindle, m.d.
3x36" Jones & Lamson 1 spindle, m.d.
Nos. 4, 5 Foster Turret
Nos. 5A, 6A, 7A, 6C Potter & Johnston Automatics, m.d.
21"x8' LeBlond Mfg. Geared Head

DRILLS

5' Cincinnati Bickford Plain Radial, gear box
5' Cincinnati Bickford Universal Radial, gear box
6' Dreses Universal Radial, Gear Box
Nos. 121, 216, 217, 220, 310, 314, 315 Baker H.D. Drills
Nos. 2, 4, 14, 22 Colburn Mfg. Drills
4 spindle No. 2 Colburn Mfg.
D2, D3, D4 Colburn, H.D.
6 spindle No. 1 Avey-Matic, m.d.
4 spindle No. 2 Avey-Matic, m.d.
4 and 6 spindle No. 3 Avey, m.d.
6 spindle No. ½ Avey, m.d.
1, 2, 4 spindle Leland & Gifford
21", 24", 28", 36" Cincinnati Bickford Upright
20", 21", 24", 28", 32", 40", Aurora Upright

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CLEVELAND 2½" bar
NILES BEMENT POND No. 1 Portable
BARRETT No. 2, 4⅞" bar
BEAMAN & SMITH 5" bar
RYERSON No. 12, 4" bar
NILES BEMENT POND HB3, 5" bar

BORING MILLS—Vertical

BULLARD 24", 36", 42"
NILES BEMENT POND 52", 2 hds.
NILES 7'-10' Extension
NILES BEMENT POND 10-16' Ext.
BETTS 90"; 2 hds.

PLANERS

NILES BEMENT POND 42"x42"x14'; 4 hds.
NILES BEMENT POND 60"x60"x32'; 4 hds.
NILES BEMENT POND 72"x84"x14'; 4 hds.

MILLING MACHINES—Plain and Universal

CINCINNATI, Nos. 2, 3, 4 Plain; SPD. cone dr.
BROWN & SHARPE Nos. 2, 3, 4 Plain; SPD. cone dr.
BROWN & SHARPE No. 2A, No. 2, No. 4 Univ.

MILLING MACHINES—Manufacturing

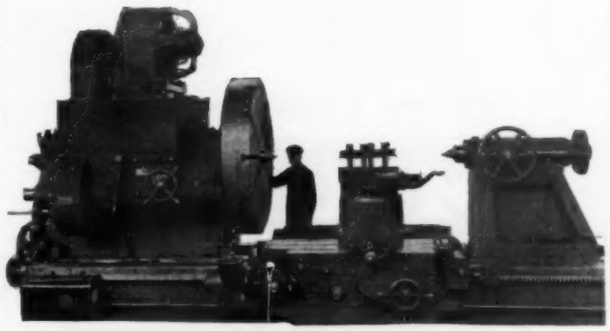
GOOLEY & EDLUND (Briggs) types A & B
CINCINNATI 18", 24" Auto.
BROWN & SHARPE No. 33 Auto.
INGERSOLL No. 3 combined heavy duty
INGERSOLL 24"x24"x12' planer type
INGERSOLL 24"x24"x12' Adj. Rail
INGERSOLL 24"x24"x12' and 24"x24"x16' Slab
NILES BEMENT POND 84"x72"x24' planer type

MILLING MACHINES—Vertical and Thread

BECKER No. 4B, C I and C Vertical
PRATT & WHITNEY 6x14, 6x48 Thread

LATHES

NILES BEMENT POND 86"x19' grd. hd.
PITTSBURGH 50"x73" grd. hd.
PUTNAM 50"x30' grd. hd.
BRIDGEFORD 48"x32' grd. hd.
PITTSBURG 36"x38' grd. hd.
New PUTNAM 36"x28' grd. hd. & cone dr.
AMERICAN 36"x21' grd. hd. QCG.
BRIDGEFORD 36"x60' comb. boring and turning



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Bed length to suit your requirements

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BRIDGEFORD 36"x60' boring
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McCABE 24-48"x14' double spindle
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LEBLOND 25"x12' cone dr.
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MONARCH 14"x10' grd. hd.
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GISHOLT No. 4 Turret
GISHOLT 24" Turret
FOSTER No. 1B, No. 2B Univ. Turret
BARDONS & OLIVER No. 7 Turret

AUTOMATIC SCREW MACHINES

BROWN & SHARPE No. 0, No. 00, No. 2
GRIDLEY 9/16", ⅞", 1¼", 1¾", 2¼"
NEW BRITAIN Nos. 22, 24, 33, 454
POTTER & JOHNSTON No. 6A, No. 7A
CLEVELAND 2", 3½", ⅜-½" Model "A"
CLEVELAND ⅝" Model "B"

RADIAL DRILLS

CIN. BICKFORD 3', 6'
DRESES 3'
MORRIS 3½'
REED PRENTICE 4'
FOSDICK 5'
NILES BEMENT POND 5', 8'

DRILL PRESSES—Multiple Spindle

NATCO No. 12, No. 13, No. 22
PRATT & WHITNEY No. 12
NATCO C-11 high speed
NATCO C-13H Hydraulic
BAUSH No. 4, rect. hd. 58x42; 30 spdle.

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PORTER CABLE 9x14
ADAMS Short-cut
LEBLOND No. 9, No. 12 Multi-cut
PRATT & WHITNEY 1x18 auto.
SUNDSTRAND Stub

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FELLOWS Nos. 6, 61, 615 Gear Shapers
FELLOWS Nos. 7, 71, 712 Gear Shapers
FELLOWS No. 8B Burnisher
LEES BRADNER Planisher
GLEASON 24", 37" Gear Planers
BARBER COLMAN Nos. 2, 3, 12 Gear Hobbers
BROWN & SHARPE No. 34 Gear Hobbers
CLEVELAND 8 spindle Gear Hobber
GOULD & EBERHARDT 18" Gear Hobber
GOULD & EBERHARDT 36BM Gear Rougher
GLEASON 6-11-18" Bevel Gear Generator
GLEASON 10" spiral bevel generator
GLEASON 15" Gear Finishing Machines
GLEASON 15" Gear and Pinion Roughers
SCHUCHARDT & SCHUTTE No. 00 Gear Hobber

GRINDERS—Internal

BRYANT Nos. 3, 6, 18, 12-A
HEALD Nos. 30-55-50-65
HEALD No. 70, No. 75
HEALD No. 72-A-3 Sizematic

GRINDERS—External

NORTON 6x32, 10x36, 10x50, 10x72
LANDIS 6x18, 10x24, 10x36, 10x52, 10x72
LANDIS 20x132" cyl.
LANDIS No. 1½, No. 2, No. 3 Univ.
BESLY No. 6 type I Disc

GRINDERS—Surface

ABRASIVE No. 3
BROWN & SHARPE No. 2
PRATT & WHITNEY No. 14; BB
DIAMOND No. 2, No. 3
DIAMOND 84"

SHAPERS

POTTER & JOHNSTON 15" Univ.
STOCKBRIDGE 16"
GOULD & EBERHARDT 24" Motor dr.
LYND FARQUHAR openside
New CINCINNATI 26" Traveling Head
MORTON 48" drawcut

MISCELLANEOUS

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NATIONAL 4" forging machine
HILLES & JONES No. 4 plate bend. roll
TREADWELL 12" pipe machine
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BAKER Nos. 2, 3, 5 Keyseaters
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3" Rockford horizontal
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42" Detrick & Harvey
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72" Niles Bement Pond
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3' Dreses
4' Hammond
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No. 12 Barber Colman hobber
14", No. 5A Lees Bradner hobber
Nos. 6, 75 and 715 Fellows shapers
Nos. 3 and 4 Brown & Sharpe spur
48" Newton auto. spur
No. 2 Bitton gear miller
6" Gleason bevel generator
15" Gleason quenching press

GRINDERS

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Norton, 6"x32" to 14"x72"
Landis, 6"x18" to 16"x53"
Nos. 2 and 4 B. & S. universal
12"x36" Bath universal
No. 3 Abrasive surface
30"x72" Springfield surface
18", 24", 30", 53" Besly disc

GEARED HEAD LATHES

14"x6' American
16"x8' Lodge & Shipley
16"x8' American
16"x10' Lodge & Shipley
18"x8' Lodge & Shipley
20"x8' American

MILLERS

Nos. 2, 3 and 4 Cincinnati
Nos. 1½, 2B, 3B and 4B Brown & Sharpe
Nos. 1½BS, 2 Mfg. and 2A Milwaukee
Nos. 2 and 2½ Rockford
Nos. 3 and 4 Maximill, Kempsmith
No. 4 Hendey
No. 3A and 3A Hvy. B. & S. universal
24" and 48" Cincinnati automatic
24", 28" and 48" Cincinnati Duplex
24" and 48" Newton rotary
48" Ohio tilted offset

PLANERS

24"x24"x6' Liberty openside
30"x30"x12' Cleveland openside
32"x32"x12' Niles
36"x36"x8' Gray
36"x36"x10' Cincinnati
36"x36"x16' Cleveland openside
48"x36"x10' Liberty openside

PRESSES

Nos. 1 and 6 Toledo OBI
No. C4 Ferracute OBI
Nos. 55, 56, 56½, 57½ and 58 Toledo
Nos. 64, 65, 67 Consolidated
Nos. 74½ and 78½ Bliss
150 ton Ferracute coining
400 ton Hamilton coining
600 ton, No. 6K Cleveland coining
Nos. 1½ and 5A Bliss toggle
No. DDG54 Ferracute drawing
No. 266 Consolidated drawing
No. 30½ Bliss arch frame
48", No. D48 L. & A. dbl. crank
48", No. 23C Bliss dbl. crank
34", No. 4 Bliss double crank
30", No. 90C Toledo double crank
70", No. SNG 107 Ferracute dbl. crank
Nos. P2, P3, P4 and PG4 Ferracute
No. 22 Michigan horning
No. 4A Bliss Stiles horning
No. 25½ Consolidated horning

SHAPERS

16" and 24" Gould & Eberhardt
16" Cincinnati
24" Potter & Johnston
24" Walcott
24" Milwaukee
26" Stockbridge

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"WE GUARANTEE OUR MACHINES"

1—#500-¼ 16 ft. Toledo **Squaring Shear** ¼" capacity.
1—642 Niagara **Squaring Shear.** 15" gap.
1—542 Niagara **Squaring Shear.** 15" gap.
Ing.-Rand **Air Comp.** 600' cap. complete with 100 H.P. 60 cy. 3 ph. 440 V. motor.
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1—#3 Abrasive **Surface Grinder.**
1—#33 Abrasive **Surface Grinder.**
5—#2 Brown & Sharpe **Surface Grinders.**
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1—Lucas Horizontal **Boring Mill.** 3" Bar.
1—Blakeslee **Washing Machine.**
1—#2 Manville **Thread Roller.**
1—#3 LeBlond Universal **Milling Machine.** Complete; cone drive.
1—#2 LeBlond Universal **Milling Machine.** Complete; cone drive.
1—#4 Manville **Thread Roller.**
1—#2 Cincinnati Universal **Milling Machine.** Complete; cone drive.
1—#3 Cincinnati Universal **Milling Machine** 3 step cone drive. Complete; vernier gauges built in machine.
#2 Brown & Sharpe plain **Milling Machines.**
1—4½x12 Pratt & Whitney Thread **Milling Machine.**
1—#2 Cincinnati Universal **Milling Machine.** Single pulley drive.
2—#2 Kempsmith plain **Milling Machines.** Cone drive.
3—#3 Cincinnati plain **Milling Machines.** Cone drive.
2—#3 Kempsmith plain **Milling Machines.** Cone drive.
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Screw Machines #1 - 2 - 4 - 5 - 8 Warner, Swasey and Foster.
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Shapers—16-20-24". Smith & Mills, Gould & Eberhard, Cincinnati, Walcott, Rhodes, Kelley makes.
1—#58 Langlier **Swedging Machine.**
1—1000 Ton Ferrecute **Coining Press.**
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In addition to the above we have a varied line of **Disk Grinders, C. & B. Filing Machines, Hand Milling Machines, Bench Drills, Dividing Heads, Magnetic Chucks, Lathe Chucks, Power Hack Saws,** "Racine & Peerless"; machinist **Bench Vises, Kick Presses, Motors and Belting. Air compressors.** Various sizes.
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No. 3-A Brown & Sharpe Universal Mill
No. 1½, 2 Cincinnati Universal Mill
No. 3 Cincinnati Plain Mill, Single Pulley Drive
No. 3 Cincinnati Plain Mill, Cone Drive
16", 20" and 24" Gould & Eberhardt Shapers
16", 18", 20" LeBlond Engine Lathes
No. 9 LeBlond Multi-Cut Lathe
No. 4 Warner & Swasey Universal Turret Lathe
No. 2 Brown & Sharpe Surface Grinder
No. 00, 0 Brown & Sharpe Automatics
Natco 3 Way Horizontal Drill, Hydraulic Feeds
6 Ft. Cincinnati Bickford Radial Drill
2 & 4 spindle Leland Gifford Drills
No. 5—60" Brown & Sharpe Gear Cutter
No. 12 Barber Colman Gear Hobber
15" Gleason Spiral Bevel Gear Finishing Generator
144" x 5/32" Niagara Shear—Motor Drive

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When you are in the market for equipment, write us as we have hundreds of machine tools in stock.

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Pratt & Whitney Nos. 11, 12, 13 Multiple Spindle
Natco Nos. 12, 37 Multiple Spindle
Baush No. 719 Multiple Spindle
American 2', 3', 5' Radials
N-B-P 5', 6¼' Radials
Gang 2½', 3' Radials
Cincinnati-Bickford 2½', 4', 5', 6' Radials
Upright Drills—All makes and sizes
Avey 2 spindle B.B.
Henry & Wright 2 Spindle, B.B., 3 Spindle
Leland-Gifford No. 1—4 Spindle
Allen 6 Spindle B.B.

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Waltham 4" Bench Spur
Barber Colman No. 12 Hobber
Bilton No. 2½ Gear Miller
Lees-Bradner No. 5A Gear Generator
Gleason 6" Auto. Gen. Bevel Gear Planer
Gleason 4" M.D. Spiral Bevel Gear Gen.
Whiton No. 14, No. 24 Gear Cutter
B.&S. No. 3—26", No. 5—48", Gear Cutter

GRINDERS

Safety No. 374 Edge
Diamond 18" Face
Hemming No. 2 Knife
Bryant No. 6, No. 10A, No. 18A Semi-Auto. 2 Spindle Hole
Heald Nos. 60, 65 Cylinder
Disc Grinders—All makes and sizes
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Taylor 8"x8" Internal Bore
Rivett No. 6, No. 103 Internal
Norton, 6"x32", 10"x50", 10"x72", 14"x36" Plain Cyl.
Brown & Sharpe No. 10, No. 11, No. 12, No. 14, No. 16 Plain
Landis 3"x20" Hyd. Self-Contained Plain, M.D.
Landis 12"x42", 10"x52" Plain
Modern 8"x30" Plain Cyl.
Pratt & Whitney 8"x36" Barrel Spot
Pratt & Whitney 14"—B.B. Vertical Surface
Wilmarth & Morman No. 3 Auto. Surface
Diamond No. 1 Auto. Surface
Norton 6"x10"x36" M.D. Surface
Persons-Arter 12" Rotary Surface
B.&S. No. 3 Cutter & Reamer
B.&S. No. 13 Universal & Tool
Cincinnati No. 1, No. 1½ Tool & Cutter
Norton No. 2 Universal Tool & Cutter
Cincinnati 12"x36" Universal
Taft-Pierce No. 2 M.D. Universal
Landis No. 1, No. 1½, No. 3 Universal
Thompson 10"x36" Universal
Modern No. 3 Universal
Fraser No. 1 Universal

LATHES

LeBlond 9"x16" Multi-Cut
Gisholt No. 16 Simplimatic
Sundstrand 9" M.D. Mfg.
Rivett 8"x40" Screw Cutting Bench
Sloan & Chace No. 5½ Bench
Ames No. 3 Bench
Lodge & Shipley 14"x6', 14x8' Engine
Monarch 14"x6'
Prentice 14"x8', G.H. Engine
American 14"x6', 15"x6'
Rahn Larmon 16"x6'
American 16"x6', 18"x8' G.H.
Hendey 16"x7', 16"x8', Yoke Head
Lodge & Shipley 16"x5', 16"x8'
Whitcomb-Blaisdell 18"x8'
Davis 18"x8' Q.C.G.
Blaisdell 19"x17' L.C.G.
LeBlond 19"x10' Heavy Duty
Hendey 20"x10' Yoke Head
Cisco 20"x8' Heavy Duty
American 20"x8' G.H.
Whitcomb-Blaisdell 23"x14' Q.C.G.
New Haven 24"x10'
Hendey 24"x12' Yoke Head
Reed-Prentice 24"x20' L.C.G.
Putnam 25"x16' L.C.G.
Pond 25"x12' L.C.G.
Blaisdell 36"x18' L.C.G.
New Haven 48" & 60"x10' Gap
Putnam 22" & 46" Single Head Gap
Simplex 16"—26"x6' Gap
Fay & Scott 14"—28" gap
Gisholt Type "I"—24" Tilting Turret
B. & O. 5" Cap M.D. Geared Head Turret
B. & O. No. 4, 10 Turret
P. & W. 1¼x18, 2x26, 3x36 Turret
Jones & Lamson 2¼x24, 3x36 Turret

MILLERS

Browne & Sharpe No. 1 Univ.
Garvin No. 1, No. 1½ Universal
Garvin No. 2A Universal
Rockford No. 2½ Univ.
Kearney & Trecker No. 1B & No. 1½B Plain M.D.
Kempsmith No. 1 Plain
Oesterlein 34"x12"x19" Univ.
Garvin No. 13, No. 21 Plain
P. & W. No. 2 Plain Column Power
Brown & Sharpe No. 13B Production
Potter & Johnson No. 2M
Ohio No. 34 Plain
LeBlond No. 3H Plain
Kempsmith No. 2, No. 3 Cone Driven
Brown & Sharpe No. 2Y, No. 5 Plain
Brown & Sharpe No. 12 Plain
Cincinnati No. 3 Plain
P. & W. 4" Spline
Cincinnati No. 2 Vertical
Becker No. 4, 4B, 6, Vertical
Lincoln Millers of all kinds
Hand Millers—All makes and sizes
Cincinnati 18" Auto. Duplex
Gooley & Edlund Types A & B Briggs
Pratt & Whitney 5", 10" Auto
Thurston Die Millers
Ingersoll 20"x72" Slab
Niles 30" Slab
P. & W. 4¼"x12", 6"x14", 12"x48", 6"x72" Thread Millers

PLANERS

Chandler 24"x24"x8'—One Head
Cincinnati 24"x24"x8' Heavy One Head
Whitcomb Blaisdell 24"x24"x8'—One Head
Whitcomb 26"x26"x17'—Two Head
Pease 30"x30"x8'—One Head
Whitcomb Blaisdell 30"x30"x12' — Two Head
Chandler 36"x36"x12'—Two Head
Gray 42"x42"x8'—One Head
Powell 51"x32"x12'—Two Head
Whitcomb 54"x36"x11'6", Two Head

PRESSES

Ferracute Horiz. Screw Re. Drawing
Farrel Foundry 4½" Stroke Double Power
Waterbury-Farrel No. 4 Stationary Cut Back Frame Power
Waterbury-Farrel 20 ton High Speed Geared Back and Pinion Drawing
Bliss No. 61—O.B. Reducing
Consolidated No. 04, O.B.
Bliss No. 3-N
Consolidated No. 72, O.B.
American Can 600 ton Embossing
Henry & Wright 50 ton Dieing Machine
Zeh & Hahnemann No. 14—8½C Percussion
Consolidated No. 074 O.B.
Consolidated No. 74 O.B.
Waterbury-Farrel 60 Ton Knuckle Joint Embossing
Bliss No. 7, D.B.G., S.S. Drawing
Bliss No. 22 Knuckle Joint Embossing
Waterbury-Farrel No. 6 D.A. Pillar Cam
Waterbury-Farrel No. 5 D.A. Crank Pillar
Bliss No. 41 Inclinable D.A. Crank
Bliss No. 3½ Toggle Drawing D.A.
Ferracute No. 105 D.A.
Terkelsen No. D-1 150 ton Mechanical Spring
Watson Stillman 60 ton Hydraulic Broaching
V. & O. No. 12 D.A. Inclinable
Waterbury-Farrel No. 102 O.B.I.
Stiles & Parker No. 73 S.S.
Bliss No. 73¼ S.S.
Bliss No. 52-S.S.
Standard No. 4R-S.S. Reducing
Waterbury-Farrel No. 7 S.S.
Ferracute No. P3-P4-Stiles
Stoll No. 380 Punch
Bliss No. 4—Stiles—Punch

SCREW MACHINES

Gridley ⅜", 1¼", 2¼", 3¼", Automatics
Cleveland ⅜", ½", ⅝", ⅞", 2", 2¼", 2¾", 4¼" Automatics
Brown & Sharpe Automatics—all sizes
National Acme No. 53, 55, 56, 515 Automatics
Cone ⅝", 1¼" Automatics
New Britain 1"x5" Automatics
New Britain 1⅝"x7" Auto
Davenport No. 2—M.D. Auto.
New Britain No. 23, No. 24, Auto. Chucking
New Britain No. 33 Auto. Chucking
Potter & Johnson No. 5A, 6A Chuckers
Hand Screw Machines of all makes and sizes; Warner & Swasey, Foster, Brown & Sharpe, B.&O., Garvin

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LATE TYPE MACHINERY

MACHINES PURCHASED FROM FRANKLIN MOTOR COMPANY

25—**Allen, Edlund, Avey, Taylor & Fenn,** and **Leland Gifford Single & Multiple Spindle Sensitive Drills**
12—Motor Driven **Polishing Jacks, Eager, Blount, American,** 7½ H.P.
No. 70 **Heald Duplex Internal Grinder**
No. 4 **Oliver Drill Grinder**
No. 14 **Gardner Disc Grinder**
10" x 18" **Norton Plain Grinder,** motor driven
Ingersoll Cutter Grinder, motor driven
No. 3 **Brown & Sharpe Power Miller**
No. 13 **Brown & Sharpe Power Miller**
Rockford Rigid-Mill Power Miller, direct belt drive
No. 30H **Sundstrand Power Miller,** motor driven
No. 30H **Sundstrand Power Miller,** motor driven
2—No. 3 **Sundstrand Rigid-Mills,** motor driven
No. 3 **Sundstrand Double Spindle Miller,** direct belt drive
No. 3 **Rockford Vert. Rigid-Mill,** direct belt drive
2—9" **Gleason Testing Machines,** enclosed motor
Hanna Eng. Wks. Hydraulic Riveting Machine
Leighton Straightening Machine, motor driven
Boomer & Boschert Hyd. Press, belt driven, (made special for Franklin Axle Assembly)
Air **Toggle Joint Straightening Press**

•

MACHINES MAY BE INSPECTED IN BRIDGEPORT

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LATE MODEL, IMMEDIATE SHIPMENT

LATHES

14" x 6' Lodge & Shipley Geared Head
14" x 6' Hendey—Taper
16" x 10' Hendey—Taper
24" x 28' American

MILLERS

#1½ Brown & Sharpe
#2B Hendey Universal
#2 Brown & Sharpe Universal
#2B Brown & Sharpe Universal
#3 Cincinnati Plain
#3B Heavy Brown & Sharpe
#4B Heavy Brown & Sharpe
#AB Becker Vertical

JIG BORER

#2 Pratt & Whitney

BORING MILLS

30" Colburn
36" Bullard New Era
42" Bullard New Era
50" Bickford
2½" Bar Cleveland Horizontal

RADIALS & UPRIGHT DRILLS

3' American
3' Morris
4' American Triple Purpose
5' American Universal
6' Cinc. Bickford Universal
1, 2, 3, 4 Spindle Allen and Leland Giffords

MISCELLANEOUS

#4 Warner & Swasey Universal Turret Lathe
#2 Barber-Colman Hobbers
16" Arter Rotary Grinder
Sleeper & Hartley Wire Coiler
14" Pratt & Whitney Surface Grinder
#14 Gardner Double Disc Grinder
25 ton Henry & Wright Dieing Machine

PARTIAL STOCK LIST

Send us your inquiries

Wigglesworth Machinery Co.

199 Bent Street Cambridge, Mass.

Selected Machine Tools

4—**BULLARD** 24" Vert. Boring Mills, PRT, taper & thread att.
KING 30" Vertical Turret, self contained, gear box
AMERICAN 2' **RADIAL,** single pulley gear box drive
BICKFORD 4' **RADIAL,** single pulley gear box drive
WARNER & SWASEY #2A UNIVERSAL Turret, motor drive
CINCINNATI #3 Geared Head Full Universal Turret, m.d.
POTTER & JOHNSON #6C Semi Automatic Turret arr. m.d.
RACINE 12" x 12" High Speed Hack Saw, arr. m.d.
CINCINNATI 12" x 36" Universal Grinder
MITTS & MERRILL #2 Keyseater with extra cutters
SOUTH BEND 13" x 6' Underneath Motor Drive lathe, q.c.g., pan
HENDEY 14" x 8' Yoke Head, q.c.g., lathe, taper att.
4—**LEBLOND** 14" x 8' lathes, q.c.g., taper att., swing 16"
LODGE & SHIPLEY 16" x 6' GEARED Head lathe, s.p.d., pan
HENDEY 14" x 10' Geared Head lathe, arr. m.d., taper att.
HENDEY 16" x 10' Geared Head lathe, motor drive, taper
HENDEY 18" x 8' Geared Head lathe, motor drive, taper
BRADFORD 20" x 14' lathe, q.c.g., cone drive, complete
PUTNAM 26"/57" x 18' Extension Gap lathe, s.q.c.
McCABE 26"/48" x 16' Two in One Lathe, cone drive
REED 24" x 14' Lathe, quick change gear, c.d.
WHITCOMB-BLAISDELL 26"x15' Lathe, q. c. g. taper att.
BECKER #2A Vertical Miller, arr. motor drive
BECKER #4 Vertical Miller, b.d., Rotary Table
BECKER #AB Vertical Miller, Rotary Table
CINCINNATI #2 Universal Miller, b.d., Vertical Att.
HENDEY #2 Universal Miler, belt drive, complete
LEBLOND #3 Heavy Duty Geared Head Plain Miller, s.p.d.
KNIGHT #2 Vertical Miller & Drill, q.c.g., s.p.d.
HEAVY DUTY ROLLS, 8'6", 10" Diameter Rolls, Power Driven
HEAVY DUTY ROLLS, 10' 12" Diameter Rolls, Power Driven
CINCINNATI 24" Shaper, motor drive, Universal Table
CAMPBELL #2 NIBLING Machine, ⅜" capacity
BLISS CONSOLIDATED #3 Incl. Power Press, 2½" stroke
BLISS #20 Incl. Power Press, 2" stroke
2—**MANVILLE** #0 Four Slide Wire Formers, Brand New, big reduction

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CHAMBERSBURG VERTICAL HYDRAULIC FLANGING PRESS, Hydro Electric operated by 5300 lbs. water pressure, self-contained with motor and pump on side, 150 ton capacity. 2—Vertical Rolls 6" dia. x 30" stroke, 75 tons each cap. 1—Horizontal Ram 5" dia. x 18" stroke, 50 ton cap. Weight of press complete about 35 tons. Machine 2 years old. **COST NEW** $12,000, our price $2500 F.O.B. Cars, Boston, Mass.

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Machine Shop and Toolroom Equipment, Boring Mills, Lathes, Power Presses, Drops, Production Machinery, Electric Motors, Generators, Plating Dynamos.

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Modern Machines at Attractive Prices

BORING MILLS
Vertical

42", 36", 24" Bullard New Era Type Vertical Turret Lathes
84" Niles-Bement-Pond
72" Colburn
60" Colburn
60" Bullard
48" Colburn
42" Bullard

BORING MILLS
Horizontal

No. 32 Giddings & Lewis, 3⅛" spindle
3¼" spindle Blomquist-Eck
2¾" spindle Lucas
4½" spindle Niles-Bement-Pond, duplex control

MILLING MACHINES

No. 5 Cincinnati High Power Rectangular Overarm Plain, Power Rapid Traverse, Intermittent Feed
Nos. 5, 4, 3, 2 Cincinnati High Power Plain, Power Rapid Traverse.
No. 4, 3, 2 Cincinnati High Power Vertical, Power Rapid Traverse.
No. 2 Cincinnati High Power Universal
No. 15 Garvin Vertical
32"x32"x12' Ingersoll, Adjustable Rail, two rail and two side heads

GRINDERS

No. 16 Blanchard Direct Motor Drive, 30" magnetic chuck
No. 3 Bryant Internal
No. 2 Brown & Sharpe Surface
No. 10 Brown & Sharpe Plain Self-Contained, 6"x20"
No. 65 Heald Cylinder
10"x30" Webster-Perks Universal
84" Diamond Face

LATHES

42"x24' Niles-Bement-Pond
36"x16' Fitchburg
32"x14' Bridgeford
30"x12' Lodge & Shipley
30"x16' Houston, Stanwood & Gamble
28"x18' Chard
26"x24' Putnam
26"x12' Pittsburgh
18"x 8' LeBlond
17"x 6' LeBlond

RADIAL DRILLS AND DRILL PRESSES

8' Cincinnati-Bickford Enclosed Head
6' Cincinnati-Bickford Enclosed Head
6' American Triple Purpose Enclosed Hd.
5' American Triple Purpose Enclosed Hd.
3' Cincinnati-Bickford
3' and 3½' Carlton
No. 4 Colburn Heavy Duty
42" Cincinnati-Bickford, Tapping
No. 1-S Garvin Duplex Horizontal

MISCELLANEOUS

AUTOMATIC SCREW MACHINE, 2½" Cleveland Model "A"
AUTOMATIC SCREW MACHINE, 2¼" Gridley Four-Spindle
BOLT CUTTER, 2" Acme Double Spindle, equipped with Landis Heads
GEAR GENERATORS, 8" Gleason Spiral Bevel
HAMMERS, 150 lb. and 300 lb. Bradley Upright Helve
KEYSEATER, No. 0 Baker
PIPE MACHINES, 6" and 8" Stoever
PLANER, 60" x 54" x 16' Woodward & Powell, Three Heads
SHEAR, No. 5-E Niagara Gap Type Squaring Shear, Capacity 60"x¼", 18" gap
TURRET LATHE, No. 2-A Warner & Swasey Universal
TURRET LATHE, 24" Gisholt, 6¼" diameter spindle
TURRET LATHE, 18" Libby

Always in the Market to purchase single or entire plant of high grade machines, similar to items listed.

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BROWN and SHARPE AUTOMATIC SCREW MACHINES—HI-SPEED:

No. 00 Full Automatic, Ser. Nos. 10000 with Auto. Rod Magazines.
No. 00 Turret Formers.
No. 00 Full Automatics, Std. speed, Ser. Nos. 9000.
No. 0 Full Automatic, Ser. Nos. 7000 with Auto. Rod Magazines.
No. 0 Turret Formers, Ser. Nos. 7000 with Auto. Rod Magazines.
No. 0 Full Automatics, Ser. No. 5800, Std. Speed.

LATHES:

12"-14"-16" Hendey Lathes, Ser. No. 27000

SHAPERS:

16" Gould & Eberhardt, S.P.D.
16"-20"-24" Cincinnati, S.P.D.

GRINDERS:

No. 3 and 33 Abrasive Surface
No. 10 and No. 11 Brown & Sharpe, Plain, S.P.D.
No. 2 Brown & Sharpe Universal, Ser. No. 3000

MILLERS:

No. 1 & No. 2 Kearney & Trecker, Plain and Vertical
No. 21 Brown & Sharpe Auto. Millers

PRESSES:

No. 20 & 21½ Bliss, O.B.I.
No. 16-16B & 40 Bliss Horning
No. 3A-4-5A-6A Toggle

MISCELLANEOUS:

Rockwell Tester
No. 40 Anderson Tapper

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Air Compressors, 6x6" Gardner, 1&2-cyl.
Air Compressors, 10x8" Ing-Rand., type ER-1.
Arbor Presses, No. 8 Greenerd; 30-T. Lourie, hand.
Bender & Straightener, Carlin, 10" beam, M.D.
Bender & Straightener No. 4 H. & J. 15" beam, M.D.
Blowers, Pressure & Volume, belt&M.D.
Blowers, Pressure 3, 5 & 7½ HP. 3/60/220 V.
Boring Mills, Vert. 30", 42", 60" & 72", M.D.
Boring Mills, 2-column, 6" bars, Mill. Att., M.D.
Brake, 10'6"x10 ga. Geo. A. Ohl., belt drive.
Brake, Hand, 4'x10 ga. Robinson; 5' x 12 ga. Chgo.
Brake Hand Comb., 42"x20 ga. P. S. & W.
Cranes, O.E.T. 5-Ton to 50-Ton, 220 V. DC.
Cranes, O.E.T. 4 & 15-Ton, 60' span, 3/60/220.
Drill, Radial, 5' Western, Q.C.G., Gear Box.
Drill, 16-Spdl. No. 11 Natco., for M.D.
Drill, 24" Aurora, B.G. Tapping Att. (2)
Forging Machine, 1½" Acme, for M.D. (New 1927)
Grinder, 30"x6" Landis, for M.D.
Grinder, No. 14 P. & W., Mag. Chuck 14"x40", S.P.D.
Grinder No. 3 B. & S. Universal, C/S.
Grinder, 7½ HP. U.S. 3/60/220, Dbl. End.
Grinder & Polisher, 3 HP. US. 3/60/220, D.E.
Hack Saws, 4x4"; 6x6", Marvel & Peerless.
Hammer, 50 lb. Boss, belted (never used).
Hammer, 50 & 100 lb., Little Giant.
Hammer, 40 lb. Bradley, Horiz. Helve.
Hammer, 200 lb. Beaudry Power.
Hammer, 400 lb. Bliss Board Drop (rebuilt)
Hammer, 800 lb. Erie Sgl. Frame, Steam or Air.
Hammer, 1000 lb. Chambersburg Steam Drop.
Hammer, 1500 lb. Massillon All Steel, St. Drop.
Hoists, Chain, 4-Ton Yale & Towne Triplex.
Keyseaters, No. 2 Catlin; No. 3 M&M., belt Dr.
Keyseaters, 24"x2½" Morton, table 26x26", belt.
Keyseaters, Miller, No. 4 Burr, cap. 4½", belt or MD.
Lathes, 14" to 36", various lengths, belt or MD.
Miller, Plain, No. 4 Ohio Special, range: 72x30x20".
Pipe Machine, 4" Williams, Gear Box for M.D.
Pipe Machines, Jarecki 3", 6" & 12", belt.
Pipe Machines, Wieland, 18", for M.D.
Planer, 72"x56"x20' Cin. 3-hds, Rev. M.D.
Planer, 48"x48"x10' Gray, 3-hds., bltd.
Planer, 36"x36"x8' Gray, 4-hds., belted.
Planer, Rotary, 27" head, Newton., for M.D.
Press, Tire, 250-Ton Boomer & Boschart, MD.
Press, Trimming, No. 58-Toledo, D.B.G., Tie-Rod, bed 30⅛x52", die space 26", str. 10", for M.D.
Press, No. 78½ Bliss, D.B.G., TR., 10" stroke.
Press, Horn, No. 2 Swaine, 2" stroke, Wt. 2500 lbs.
Press, Wheel, 60-Ton, Horiz., W-S., belted.
Punch & Shear, Cleveland G. 48" tht. cap. 2x1", MD.
Punch & Shear, Cleveland C. 24" tht. cap. ⅝x⅜" Arch. jaw., Belt or Motor Drive.
Punch & Shear, New Doty, cap. 1¼x1", DE; MD.
Punch & Shear, Triple No. 25-U, Buffalo Armor Plate., cap. 1"x⅝"., for M.D.
Punch & Coper, No. 12 W-W., 25" tht. Vert. 35", 200-T.
Riveters, Shuster, ⅛" & 3/16", belted. (2)
Riveters, No. 120 Grant, cap. ⅝"., for M.D.
Rolling Mills, No. 3 Oliver; No. 5 Buffalo, power.
Saw, Cold, No. 7 Espen Lucas, cap. 15" beams.
Shapers, 24", 20" & 16" G&E., belt or M.D.
Shear, Dbl. Angle, 6x6x1", L&A, on turntable. MD.
Shear, Slitting Bar & Angle, No. 24-S. Buffalo. (steel)
Shear, Open Back, 3¼" shaft, United, MD. (2)
Shear, Squaring, 12'x10ga. Niagara No. 3144, belted.
Shear, Plate, 16'x¼" L&A. 20" gap, for MD.
Shear, Thtless, No. 112 Marshalltown, cap. ¼" AC. Motor.
Testing Machine, 100-Ton Olsen Compression.
Turbines, 100 HP. Wghse, 900 Rev. Ext. base. (2)
Turret Lathe, 20"x4½ Libby, M.D.
Turret Lathe, 24"x6¾" Steinle, M.D.
Turret Lathe, 18"x3¼" Libby., M.D.
Welder, Arc. 300 Amp. Star, 3/60/-220 V.
Wire Str. & Cut-Off Mach., cap. 4'x⅛" Shuster (2)

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No. 5 Cincinnati, High Powered, Rapid Traverse, Plain, Round Overarm, S.P.D.
No. 4 Cincinnati, High Powered, Rapid Traverse, Plain, Round Overarm, S.P.D.
V2 Newton 84" Continuous, Rotary, Motor Driven.
Ingersoll Planer Type Mills, 40"x38"x20' and 36"x24"x 20', motor driven.
18" Cincinnati Auto. Duplex.
No. 4-B Heavy Brown & Sharpe Plain, Horizontal, hi-powered, quick return, S.P.D.

GEAR MACHINERY

4—Lee Bradner No. 5-A Gear Hobbers, with high speed attachments.
No. 12 Barber Coleman Gear Hobber.
36" Gould & Eberhart, Roughing.
DeWhiton No. 2 Bevel.

AUTOMATICS

¾" Gridley, 4 spdle., Mod. F.
2¼" Gridley, 4 sp., Mod. F.
2½" Cleveland Model A, sgle. spindle.
G. A. Gray Planer, 72" between housing, 48" under rail, 16' between pockets, 2 heads on cross rail.

DRILL PRESSES

Pratt & Whitney Hvy. Duty 2 spindle, automatic return production drill, with indexing table.
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42" Hamilton Universal Radial Drill, M.D.
3-Spindle Barnes, B.G.PF. S.H.

INTERNAL AND EXTERNAL GRINDERS

No. 12 Terromatic M.D. 3-60-220-440.
No. 52 Hydroil Int. Grinder, Type 52-1-Y-1.

TURRET LATHES

No. 6-A Potter & Johnston.
No. 5-A Potter & Johnston.

PUNCH PRESSES

No. 60 Bliss Reducing Press.
No. DDG-56 Ferracute 16" stroke.
Waterbury-Farrel 1" Thread Roller.

POWER & HAND BRAKES

42", 48", 72", 96", 120" Steel Brakes.

Over 500 Metal and Woodworking Machines in Stock. Send Us Your Inquiries.

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14"x 6' LeBlond
16"x 8' LeBlond
18"x10' American Geared Head
20"x 8' Prentice Geared Head
20"x10' Hendey
21"x 8' LeBlond
24"x12' Crawford

TURRET LATHES

1¼" Milholland
1½" Acme
#4 Warner & Swasey

DRILLS

21" Cincinnati Motor Drive
24" Cincinnati Motor Drive
48" Barnes Motor Drive

RADIAL DRILLS

3' Cincinnati Bickford
4' Western
4' Dreses
5' Dreses
6' American

GRINDERS

#2 Brown & Sharpe Surface
#6 Bryant Chucking
½" to 3" Oliver Drill
10"x36" Landis, Self Contained

PLANER

30"x30"x8' Detrick & Harvey Openside

PUNCH AND SHEAR

#16 Pels Universal Motor Drive

BOLT CUTTERS

1" Landis
1½" Greenfield
2" Greenfield

MISCELLANEOUS

10" Dill Slotter
#3B LaPointe Broach
300 Ton United Steam Hydraulic Press
24" Bullard Vertical Boring Mill, Rapid Production

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MOTORS, all types and sizes

AIR COMPRESSORS **BOILERS**

BLOWERS **ENGINES**

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A FEW ALMOST NEW Machine Tools from Our Stock . . .

No. 2 Brown & Sharpe **Vertical Miller,** motor drive
No. 2 Brown & Sharpe **Vertical Miller,** cone drive
No. 3 Brown & Sharpe **Vertical Miller,** Timken Bearing Spindle, rapid traverse, national standard taper, power feed rotary table, motor in base.
No. 3 Brown & Sharpe **Vert. Miller,** single pulley drive.
No. 2 Knight **Milling & Drilling Machine,** motor drive
No. 1M Cincinnati **Plain & Universal Millers,** motor drive complete
No. 2M Cincinnati **Plain Miller,** Timken Bearing Spindle, rectangular overarm, motor in base, national standard spindle, with slotting attachment.
No. 2A Brown & Sharpe **Universal Miller,** motor in base, complete with vertical attachment.
No. 2 Cincinnati slotted nose, high power, single pulley drive **Plain Miller.**
No. 1½B Milwaukee Double Overarm **Miller,** single pulley drive, complete with vertical attachment
No. 4B Milwaukee double overarm **Plain Miller,** Timken Bearing Spindle, rapid traverse, national std. spdl. vert. attach., motor in base, 90" table
16" and 20" Gould & Eberhardt and Hendey, cone drive and motor drive **Shapers**
12", 14" & 16" Hendey cone, geared head 12 speed single pulley drive **Lathes,** complete
14" and 16" Lodge & Shipley 12 speed selective geared head **Lathes,** complete
3½' Cincinnati Bickford **Radial Drill,** mtr. dr. gear box.
2 No. 2 Brown & Sharpe motor in base **surface Grinders**
No. 13 Brown & Sharpe **Universal Grinder,** with lot of extra attachments and countershaft
No. 2 & No. 3 Brown & Sharpe **Universal Grinders**
28"x20' Walcott, quick change **Lathe,** double back geared 3 step cone drive, complete.

MANY OTHER LATHES, MILLERS, SHAPERS, ETC., IN OUR STOCK

WIENER MACHINERY CO., INC.
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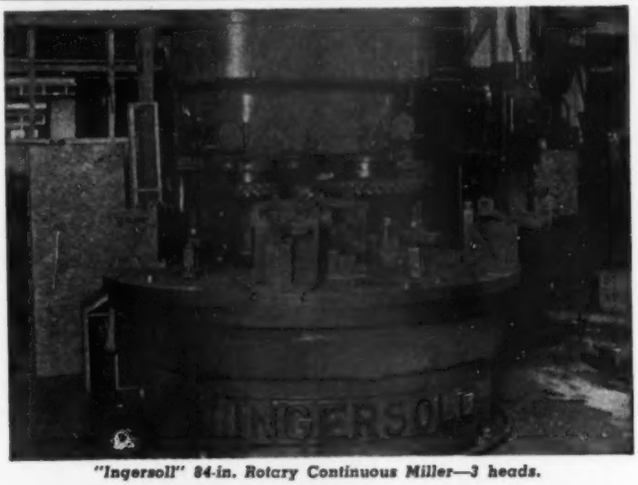

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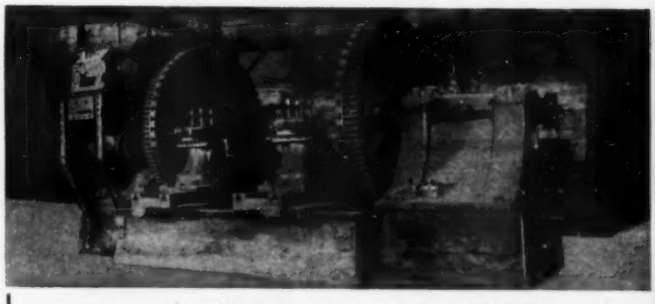
Beaman & Smith "Planer-type" Miller, Adjustable Crossrail; 5 heads; 48-in. wide; 48-in. high, table 20-ft. long; motor-drive.



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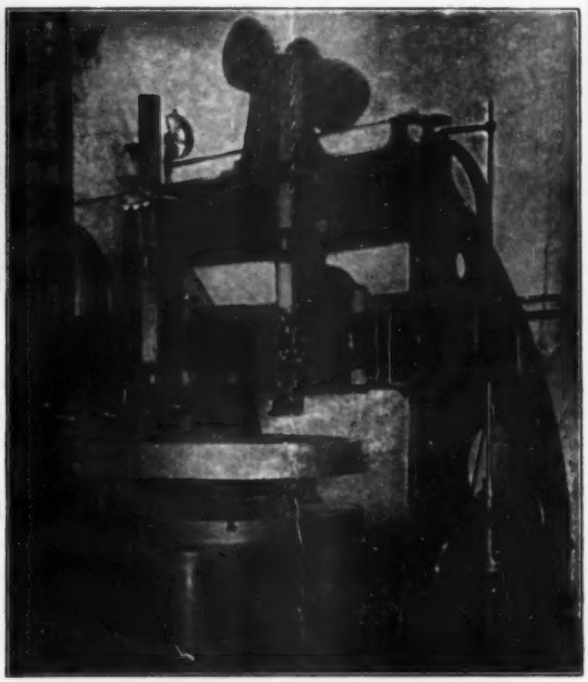

"Niles Tool Works" 10-ft. swing Upright Boring and Turning Mill, two heads and slotting attachment, belt-driven.

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3 —	1¼"	Model A	Serial 28000	Belt	Drive
1 —	⅞"	" "	" 27000	"	"
2 —	⅝"	" "	" 30000	"	"
1 —	2¾"	" "	" 27000	"	"
2 —	1⅜"	" B	" 24000	"	"
1 —	⅝"	" "	" 27000	"	"
2 —	2 "	" "	" 29000	"	"
1 —	¾"	" M	" 33000	Motor	Drive
1 —	⅞"	Nut Machine	" 33000	"	"
1 —	1⅛"	" "	" 33000	"	"
1 —	1½"	" "	" 33000	"	"

GRIDLEYS

1 —	⅞"	Model G	Serial 8500	Motor	Drive
1 —	1½"	" GA	" 15000	"	"
3 —	2¼"	" F	" 6000	Belt	"
1 —	3½"	Single Spindle	" 4700	"	"
1 —	4¾"	" "	" 11000	"	"
2 —	4¾"	" "	" 4000	Motor	"
4 —	4"	Model H Chuckers	" 15000	"	"

NEW BRITAINS

3 —	No. 652	Chuckers, Serial	22000	Belt	Drive
3 —	" 452	"	" 22900	"	"
1 —	" 654	"	" 21500	"	"
2 —	" 33	"	" 22300	"	"
1 —	1"	Six Sp. Nut Machine Serial	8777	Belt	Drive
1 —	1⅝ x 7	Bar	" 10274	"	"
1 —	1⅝ x 7	"	" 23000	Motor	"
2 —	⅝ x 3	"	" 22000	Belt	"

MISCELLANEOUS

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Loy-Nawrath Squaring Shear, 3/16"x10', back gauge motor drive.
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No. 6, 72" Brown-Sharpe Gear Cutter. Single pulley drive.
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No. 2 Pedrick floor type Boring Mill. Motor drive.
1 Cleveland wall type Radial Drill.

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No. 3 Hilles & Jones 28" throat, MD
No. 000 Hilles & Jones 1" Rd., MD
No. 1 Hilles & Jones Bar Shear, 1½" Rd., MD
No. 2 Hilles & Jones Punch with bar shearing tools; capacity 1x1¼" throat, MD
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No. 15 Williams & White, SE 24" throat, ⅛" thru ⅝", MD.
No. 14 Williams & White DE, 25" throat, 1-¼" thru 1" MD
Size A Long & Alstatter SE, 36" throat, 2" thru 1-⅛", MD
No. 9 Kling, 18" throat, 2-¼" thru 1-¼" MD
No. 5 Beatty Quick Acting Det. New ⅜" thru ½", MD
No. 1 Long & Alstatter 36" throat, 1-½" thru 1" MD
No. 7 Beatty, 42" throat, MD

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2 John F. Allan Lattice, 6" reach, 8-⅝" gap
3 Hanna Pinch Bug, 8" reach, 8" gap
3 John F. Allan Pinch Bug, 8" reach, 8" gap
1 Hanna Pinch Bug, 8" reach, 13½" Gap
1 John F. Allan Jaw, 34" reach
2 John F. Allan Jaw, 47" reach, 15" Gap
2 John F. Allan Pinch Bug, 8" reach, 13-⅜" gap
1 Hanna Yoke Stake, 12"x12".
1 Lake Erie Forge Stake, 75" reach, 18" gap.

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No. 4 B & S Plain, S.P.D.
No. 3H LeBlond
No. 3 Cincinnati Plain High Power, Cone
No. 4 Cincinnati Plain High Power, Cone
No. 4 Cincinnati Miller, Universal Cone drive
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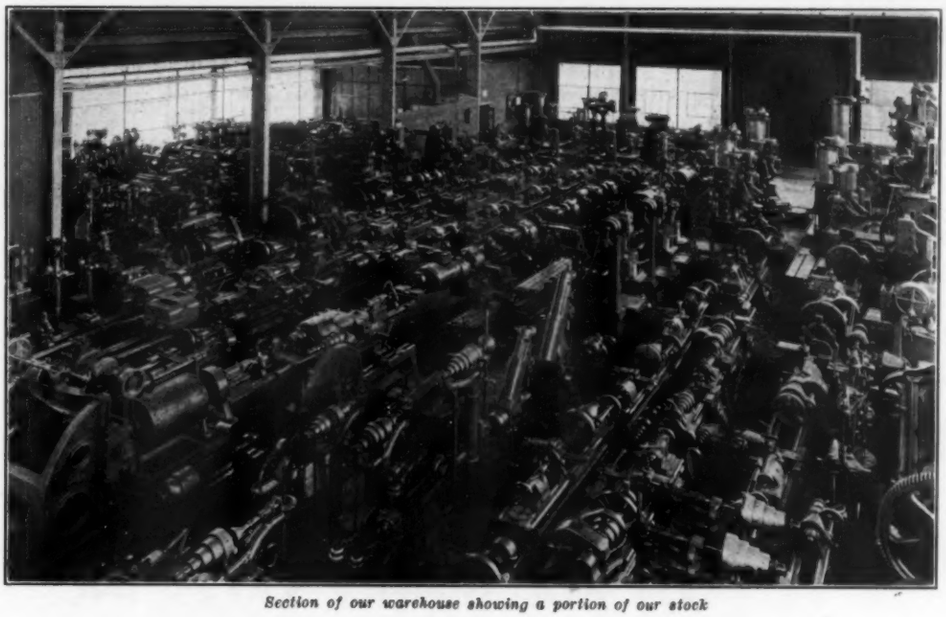

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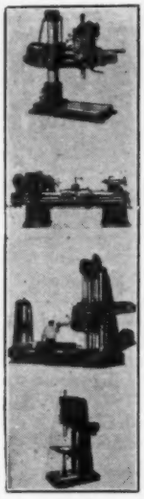

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LATHE, 16"x6' Hendey S.P.D.
LATHE, 18"x8' Hendey, B.M.D.
LATHE, Turret, No. 6 W. & S. Univ.
MILLS, No. 2B & No. 3B B. & S.
MILL, No. 3 Van Norman, M.D.
MILL, No. 3GH Hendey Univ. S.P.D.
PLANER, 30"x30"x10' Liberty O.S. M.D.
PLANER, 48"x48"x10' Liberty O.S.
PRESS, No. 14 Toledo Horning Gr.
PRESS, No. 76 Toledo O.B., M.D. & M. (2)
PRESS, No. 66 Bliss S.S. Tie Rod
PRESS, No. 102 Consolidated D.C., O.B.I.
PRESS, No. 20B Bliss O.B.I.
PRESS, No. 14 Adriance Cam
PRESS, No. 97-A Toledo Dble. Crank
PRESS, P-2, P-3, P-4 Ferracute M.D.
PRESS, DG-53 Ferracute (3)
PRESS, CAG-4 Ferracute, M.D.&M.
PRESS, No. 21 Bliss-Consolid. Horning (4)
PIPE THREADER, 6" Williams,
PIPE THREADER, 6" Oster
SHAPER, 16" Gould & Eb. M.D. (2)
SHAPER, 20" Milwaukee
SHEAR, 10' Pexto, 3/16" cap. M.D.
SHEAR, 10' Pexto, M.D. 16 ga.
SHEAR, No. 848 Niagara 3/16" cap.
SHEAR, 10' ¼" United Eng'g M.D.
SHEAR, 10' ⅜" Pittsburgh, M.D.
SHEAR, No. 736 Niagara, 36" 3/16" cap.
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No. 362 **Niagara Power Squaring Shear**, 52"x10 Gauge
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6' **Cincinnati Bickford Radial Drill**
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16"x6' **Hendey Lathe**, Q. C. G.
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DRILL, Colburn No. 4 Mfg. type, four spindle, capacity 2" in steel (like new)
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LATHE, spinning, No. 326 Toledo, 30" swing, roller bearing; comp. rest.
MILLER, planer type, Newton, 30"x10', with horiz. arbor and vert. spindle
MILLER, No. 5-C Becker, Vertical
MOTOR, 20 H.P. G.E., 3-60-220, 1200 RPM.
PLANER, 36"x36"x12' Cin., 2 heads
PLANER, 24"x24"x8' Powell, 1 hd., reversing motor drive. 220 V., D.C.
PRESS, double crank, 10' wide, 7" dia. shaft, 6" stroke; weight 35,000 lbs.
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PRESS, No. 69 Bliss cam dbl. action, grd.
PRESS, No. 3½-C Bliss Toggle drawing
PRESS, No. 2-W Bliss wiring type
PRESS, No. 60¼ Toledo, straight side, 18" stroke
RIVETING HAMMERS, No. 2A Hi-speed, M.D.
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SHAPER, 25" Smith & Mills, single pulley
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No. 3 Sunstrand Rigidmill
No. 3-B, No. 4-B Heavy Brown & Sharpe, pl.
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No. 3, No. 4 Cincinnati high power, Universal
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No. 2-B & No. 3-B Foster
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6′ Mueller Gear Box M.D.
6′ N.B.P. No. 10 R.L. motor on arm.
5′ Western; 2½′ Foedick
4 Spin. Barnes Style B No. 4 M.T.
2 Spin. Avey No. 2, 1 tapping
2 Spin. Aveymatic No. 2
2 Spin. Leland Gifford

LATHES
50″ x 30′ Pittsburgh Grd. Hd. QCG
45″ x 45′ Pond Grd. Hd. M.D.
36″ x 30′ Pond Grd. Hd. 2 carr.
32″ x 12′ Bridgeford Grd. Hd.
26″ x 21′ N.B.P. Cone QCG
18″ x 8′ American QCG cone
2 x 24—3 x 36 J & L
4L Gisholt Heavy Duty Turret
24″—26″ Libby Turret 7⅛″ hole
7″ x 60″ Fitchburg Low Swing
No. 1 N.B.P. Carwheel M.D.

MILLING MACHINES
36″ x 30″ x 12′ Ingersoll Adj. Rail
UNIV: No. 2A B & S S.P.D. Grd. Hd.
PLAIN: Nos. 3 & 4 Cinci. Grd. Hd. P.R.T.
No. 4G LeBlond Grd. Hd.
3B Milwaukee Grd. Hd.
2B Heavy. B & S Grd. Hd.
No. 2 Kempsmith Maximiller
No. 2 B & S Cullman M.D.
1B LeBlond Cullman M.D.
8″ and 12″ P & W Mfrs.
28″ Cinci. Semi Automatic

GRINDERS
Nos. 50, 55 & 65 Heald Internal
No. 2 Diamond Surface 12″x36″
15″ x 15″ x 72″ Norton Openside Surface
6″ x 10″ x 36″ Norton Openside Surface
14″ x 72″ Norton Plain Cyl.
10″ x 36″; 12″ x 36″ Norton Cyl.
84″ Diamond Face, 36″ wheel
48″ Badger Face M.D. Hyd. Feed
No. 2 Oakley Tool & Cutter

SHAPERS—PLANERS
96″ x 96″ x 24′ Pond M.D.
84″ x 84″ x 18′ N.B.P.
48″ x 48″ x 10′ D & H Openside
48″ x 36″ x 13′ N.B.P.
42″ x 36″ x 12′ Cinci. & Gray
24″ x 24″ x 6′ Cinci. M.D.
24″ and 20″ G & E Shapers
24″ Stockbridge AC M.D.
16″ Smith & Mills, Cone

AT RANDOM
No. 58½ Toledo SS Press
600 ton N.B.P. 96″ horiz. wheel press
400 ton N.B.P. 48″ horiz. wheel press
No. 26UDx24 Buffalo Comb'n Ironworker
No. 1 Buffalo Univ. Ironworker
17′ x 1¼″ Niles Bending Rolls
12′ x ⅜″ H & J No. 4 Bending Rolls
No. 3L Lapointe Hor. Hyd. Broaching Mach.
No. 13 B & S Gear Cutter
60″ B & S Gear Cutter
6B Nazel Hammer
No. 3 Mitts & Merrill Keyseater
6″ Peerless Univ. Shaping Saw
No. 8 Marvel Metal Band Saw
2G B & S Automatic
120 cu. ft. Schramm Gas Compressor
200 amp. Wilson Arc Welder
300 other tools in stock.

Finest Machinery Stock in the Metropolitan Area

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30 CHURCH ST. — NEW YORK, N. Y.

SPECIAL OFFERING
5—P & W 24 Spindle Drill Presses, Motor Driven with 5 HP Motors, 3/60/440.
1—Centerless Grinder, belt driven.
1—100# Bradley Compact Hammer.
1—60# Bradley Helve Cushion Hammer.
Full line of Machine Tools, Power Plant Equipment, and Machinery for Chemical, Process, Rubber, and Bakelite Industries.
INDUSTRIAL EQUIPMENT COMPANY
850 Broad Street, Newark, New Jersey

FOR MODERN USED MACHINE TOOLS
C. I. WROE COMPANY
11 PARK PLACE — NEW YORK, N. Y.

48″ x 16′ DETRICK & HARVEY
OPEN SIDE PLANER, WITH 3 HEADS
Condition excellent. Still set up, ready to run, at Amoskeag Mills, Manchester, N. H.
Standard Machinery & Supply Co., Inc.
218 High St. — Boston, Mass.

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Dealers in New and Used
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Entire Plants Bought and Sold
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PHONE CAnal 6—3542-3543

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MACHINERY AND TOOLS
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Phones:
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BLISS, TOLEDO, V & O, ETC.
REBUILT—GUARANTEED
JOSEPH HYMAN & SONS
Tioga, Lexington and Almond Streets
Philadelphia, Pa.

No. 2 **Brown & Sharpe Full Automatic**
No. 0 **Brown & Sharpe Full Automatic**
14″x6′ **Flathe Lathe** with compound rest
No. 31 **Toledo Back Flywheel Press**
No. 35 **Niagara Back Flywheel Press**
18″x8′ **Reed-Prentice Q.C.G. Lathe**

OGDEN R. ADAMS
266 State St. Rochester, N. Y. Main 6375

D. C. MOTORS

Adjustable Speed—230V.

HP	Make	Type	Speed
1—250	West. 3 Bear.	SA	250/750
3—120	G.E.	DMC	300/750
3— 80	Diehl	K-11-40	550/1100
1— 75	G. E.	CD	575/870
2— 60	El. Dy.	25-S	450/1200
5— 60	El. Dy.	25-S	525/1050
2— 50	West.	SK-190	225/600
1— 50	West.	SK-160	600/1200
12—40/50	Cr. Wheeler.	EM	175/700
2— 40	West.	SK	120/240
1— 40	West.		300/900
2— 35	West.	SK	500/1500
1— 30	El. Dy. B.B.	10-S	800/1600
15— 20	G. E.	LC	650/1950
1— 20	G. E.	RF-12	500/1500
1— 20	G. E.	RF-11	500/1500
1—18/22	West.	SK-160	133/266
1— 15	El. Dy.	10-S	450/1350
1— 15	Reliance	E	400/1600
1— 15	El. Dy. B.B.	10-S	450/1350
1—12½	West.	SK-160	177/355
15— 10	West.	SK-90	500/1500
2— 10	G. E. (B.B.)		600/1800
1— 10	G. E.	RF-12	325/1300
1— 10	G. E.	RF-10	550/1650

Above are a few of our stock items

BELYEA
COMPANY, INC.
151 WEST 18TH STREET
NEW YORK, N. Y.

FOR YOUR ELECTRICAL EQUIPMENT

230 VOLT D.C. MOTORS

HP	Make	Type	RPM
150	Gen. Elec.	RC	1750
100	West.	SK (2)	625
75	El. Dyn.	311N (3)	400
60	Gen. Elec.	RC	700
50	Gen. Elec.	CD	1200/1600
50	Gen. Elec.	CO-1810	725/1800
40	Gen. Elec.	LC	700/1000
25	West.	SK	650/2200
15	Cr. Wheeler	CM	900/1800
15	West.	SK	825/1650
15	West.	SK	600/1500
10	Star	5B5	3600
10	West.	SK83	400/1600
7½	Gen. Elec.	RF	600/1800
5.6	West.	SK60	500/1500
5	Gen. Elec.	CO-1802	875/2700
5	Gen. Elec.	RF	475/1425

87—¼ to 5 HP—all speeds

SLIP RING A.C. MOTORS
2 and 3 Ph.

HP	Make	Type	RPM
125	Cr. Wheeler	125AQ	600
100	Fair.-Morse	BA	720
100	Gen. Elec.	IM	720
100	West.	CI	720
80	Gen. Elec.	MTC336	1200
75	Gen. Elec.	MT343	1200
75	Gen. Elec.		
75	Gen. Elec.	MT558	900
75	Gen. Elec.	IM	600

PEATER
5000 Amp. World 514 rpm. motor driven.

ELECTRIC HOISTS
A.C. and D.C.
5 Ton G.E. Sprague, 220 D.C.
4 Ton Sprague A.C.
3 Ton Sprague A.C.

A.C. GENERATORS 2 and 3 Ph.
150 KW. Allis Chalmers, D.C. Exciter, 900 rpm.
112.5 KVA G.E. ATB, 1200 rpm.
100 KW. Gen. Elec. 900 rpm.
100 KVA. G. E. ATB, 900 rpm.
90 KW. Gen. Elec. 900 rpm.
75 KVA. Westinghouse, 900 rpm.
85 KW. Westinghouse, 720 rpm.
75 KVA. G. E. ATB, 1200 rpm.
75 KW. G. E. ATB, 1200 rpm.
60 KW. G. E. ATB, 1200 rpm.
50 KW. G. E. ATB, 720 rpm.
30 KVA. Westghse, 1200 rpm., 1 PH. Generator, 3 PH. motor.
17 other A.C. Gen. also in Stock.

3 Ton G.E. Sprague, 220 D.C.
1 Ton G.E. Sprague, 115 D.C.
½ Ton Shepard, 220 D.C.
1 Ton American, 220 D.C.

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GOOD USED Structures

70'x140'; 90'x170'; 50'x200'
75'x150'; 50'x100'; 60'x300'

We can adapt buildings to suit your requirements.

"Buyers & sellers of steel buildings of all kinds"

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RAILWAY EXCHANGE, CHICAGO, ILL.
"Anything so long as it contains Iron or Steel"

Surplus Machinery and Equipment

Brown & Sharpe Automatic Screw Machines
National Acme Automatics 1⅝"—1"—9/16"—& No. 53.
Hendey and other make Lathes
Gould & Eberhardt 16" and 20" H.D. Shapers
Brown & Sharpe Milling Machines No. 0—1—1½—3 etc.
Surface Grinders and Cylindrical Grinders
Drill Presses—various types and sizes
Metal Squaring Shears and Metal Slitters
Electric Welders and Metal Washing Machines
Hydraulic Presses and Pumps
Punch Presses various types and sizes
Air Compressors and Sand Blast Equipment
Generators—Motors and Electrical Equipment
Plating Barrels—Tanks—Crocks—Tumbling Barrels
Steel Shelving, Wire Screen, Benches & Conveyors
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Above are a few of the items for sale
Catalog Supplied on Request

Atwater Kent Manufacturing Company
4700 Wissahickon Ave. Phila., Pa.

SPECIALS

AIR COMPRESSOR—8"x6"—2 cyl. vr. Gardner
BRAKE POWER 10' capacity 10G.
DRILLS, RADIAL, 2—3' Western; 1—4' Dreses, M.D. with motor; 1—4' Morrison, M.D. with motor; 2—21" Cin. Super, M.D. with motor.
ELEC. DRUM CONT. 225 H.P. with grids
GEAR HOBBER, No. 12 Barber-Coleman; No. 12 Brown & Sharpe
GRINDER, Disc No. 24 Gardner, Cont. Feed, M.D.; No. 2 Cincinnati Cylindrical
MILLS, Boring 24" Bullard Vertical S.P.D.; No. 6 Becker Vertical Cone Drive; 2—No. 4 Cincinnati Pl. C.D.; No. 4 LeBlond Pl. C.D.
PIPE MACHINE, Landis M.D. Cap. to 4"
POLISHING LATHES 50 Mitchels T-L-P
ROLLS 5¼"x48" Plate Bending
TAPPERS, No. 2 & 2X Garvin
TUMBLING MILL, 40x76" Sly
WELDERS, Butt, A.C. 35, 50, 75, & 100 KW.; Projection, Federal A.C. 100 KW.; Seam, A.C. 50 KVA. Universal Head.

Surplus Material & Machinery Co.
8735 Kercheval Ave. Detroit, Mich.

R. A. VINE

652 W. Willis Ave.
DETROIT, MICH.

Presses, Production & Tool Room Machinery

8-spdle Leland-Gifford Sens. Drill
(2) No. 70 Heald Grinders, MD & BD
No. 12 Bryant Grinder, M. D.
Brown & Sharpe Surf. Grinders, BD & MD.
No. 33 Abrasive Surf. Grinder

GOOD USED POWER EQUIPMENT

Immediate Delivery—Substantial Savings

Boilers, Engines, Turbines, Generators, Motors, Compressors, Pumps, Transformers, Condensers, Converters, Fans, Speed Reducers, etc., etc.
Write for free copy of nationally advertised lists of equipment now available.

Departmental Advertising Staff

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Each announcement represents a current Want of a concern or individual in the industry with some element of profit in each for whoever can fulfill the need. Some have money saving possibilities, others are opportunities for more business; many are employment opportunities while still others offer chances to buy going businesses, plants, property, etc.

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For Every Business Want *"Think* SEARCHLIGHT *First"*

0140

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Positions Vacant and all other classifications, excepting Equipment, 10 cents a word, minimum charge $2.00.
Positions Wanted (full or part-time salaried employment only) ½ the above rates, payable in advance.
(See ¶ on Box Numbers.)
Proposals, 40 cents a line an insertion.

INFORMATION:
Box Numbers in care of our New York, Chicago or San Francisco offices count 10 words additional in undisplayed ads. Replies forwarded without extra charge.
Discount of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

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1 inch $6.25
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4 to 7 inches..... 5.75 an inch
8 to 14 inches..... 5.50 an inch
Other spaces and contract rates on request.
An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page. A.M.

POSITIONS VACANT

A PRECISION TOOL designer for small tool work. One who can do layout work as well as detail, preferably one with collapsible tap and self opening die head experience. P-165, American Machinist, 330 West 42nd Street, New York City.

ASSISTANT SUPERINTENDENT for Machine, Sheet Metal and Plate Shop. Thorough knowledge of all manufacturing operations. Experienced man between 30 and 40 years who is able to handle men; train inexperienced men; obtaining good production at minimum costs. This is a progressive manufacturing plant located in Western Maryland. Give complete training, experience and references in first letter. P-167, American Machinist, 330 West 42nd Street, New York City.

WANTED: Man experienced as finisher in machine tool industry for demonstration and servicing of finishes. Reply with full particulars. P-176, American Machinist, 330 West 42nd Street, New York City.

MASTER MECHANIC for southern tier New York State industry. Must possess working knowledge of all crafts. First letter to state complete experience in detail also age, references and salary desired. P-178, American Machinist, 330 West 42nd Street, New York City.

EMPLOYMENT SERVICE

SALARIED POSITIONS. $2,500 to $25,000. This thoroughly organized advertising service of 27 years' recognized standing and reputation carries on preliminary standing and reputation of the caliber indicated, through procedure individualized to each client's personal requirements. Several weeks are required to negotiate and each individual must finance the moderate cost of his own campaign. Retaining fee protected by a refund provision as stipulated in our agreements. Identity is covered and, if employed, present position protected. If you have actually earned over $2,500, send only name and address for details. R. W. Bixby, Inc., 266 Delaware Bldg., Buffalo, N. Y. (A.M.)

RATE DEPARTMENT HEAD

Thorough experienced, with a broad knowledge of machine work, and setting of rates. Must be able to handle men and to co-operate with others. Plant is located in New Jersey, adjacent to Newark. In replying, give for the past ten years the names of your employers, and details of the positions held with each. Also, give age, nationality, and marital status.

P-174-American Machinist
330 W. 42nd Street, New York City

POSITIONS WANTED

Connecticut

MASTER MECHANIC, 12 years experience in engineering, development, tool designing and drafting. PW-175, American Machinist, 330 West 42nd Street, New York City.

WORKS MANAGER or superintendent; practical mechanic, thoroughly experienced in plant management including planning, methods, tools, materials and costs. Excellent organizer and capable executive. Broad experience in manufacture of high grade interchangeable parts. Location immaterial. PW-171, American Machinist, 330 West 42nd Street, New York City.

New Jersey

MECHANICAL ENGINEER of wide experience, now employed, is looking for a better opportunity. Expert in the development of automatic machinery, college graduate, shop trained, neat and accurate draftsman and designer, good checker and a successful executive. Member of the American Society of Mechanical Engineers. PW-132, American Machinist, 330 West 42d Street, New York Cty.

EXECUTIVE machine shop and foundry practice, costs, methods and production. Has successful background with technical training. Desires change. Location New Jersey. PW-181, American Machinist, 330 West 42d Street, New York City.

New York

SUPERVISOR. Machine or tool work, experienced all around machinist and tool maker, technical education, capable executive and leader, age 37. PW-172, American Machinist, 330 West 42nd Street, New York City.

DIEMAKER all around, experienced foreman tool room and production, wish to connect with firm in New York City. PW-179, American Machinist, 330 West 42nd Street, New York City.

Pennsylvania

EXECUTIVE-ACCOUNTANT, of highest caliber and exceptional ability. University Graduate and technically trained, backed by 24 years of wide experience in the metal working industry in all phases of executive work, is seeking better opportunity. Location immaterial. Excellent references. PW-177, American Machinist, 330 West 42nd Street, New York City.

ENGINEER—Mechanical engineering graduate, experienced toolmaker and draftsman. Activities have included electrical refrigerator manufacturing, tool and methods planning, factory layout, wage payment work, and tool and machine design. Location immaterial. PW-173, American Machinist, 330 West 42nd Street, New York City.

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OFFERED—WANTED
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WANTED

ANYTHING within reason this is wanted in the field served by American Machinist can be quickly located through bringing it to the attention of thousands of men whose interest is assured because this is the business paper they read.

WANTED

Employment Opportunities:

Well-established Central Ohio plant manufacturing an interesting line of heavy and medium sized machinery is expanding its organization and requires:

2 FOREMEN experienced in supervision of groups of standard machine tools.
3 INSPECTORS familiar with large work.
2 RATE-SETTERS for standard machine tools.
3 TOOL DESIGNERS and PLANT LAYOUT MEN; general machinery experience preferred to automotive.

Applications are also invited from all-round Machinists, Tool Makers, and Erectors who are looking for an opportunity to advance into supervisory positions.

To command attention, first letter must give complete information concerning personal qualifications, technical experience and training, and salary requirements.

All applications will be acknowledged and held in confidence.

P-180 American Machinist — 520 No. Michigan Ave., Chicago, Ill.

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& STRUCTURES
ANY SIZE OR LOCATION
ALSO PLANTS AND EQUIPMENT
Are you in the market for any Buildings?
IRON & STEEL PRODUCTS, Inc.
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"Anything so long as it contains Iron or Steel"

WANTED
MILLING MACHINE

No. 2 Size, Late Model with dividing head and vertical attachment, arranged for motor drive. Must be in an exceptionally fine condition.

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9 Preston Street — Ridgefield Park, N. J.

WANTED

33"x60"x16' geared head gap Lathe, M.D.
Swiss and P & W Jig Borers

D. E. DONY MACHINERY CO.
1115 Bay Street — Rochester, N. Y

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Abrasive Company, Tacony & Fraley St., Phila.
Carborundum Co., Niagara Falls, N. Y.
Mid-West Abrasive Co., 3189 Beaufait St., Detroit, Mich.
Norton Company, Worcester, Mass.
Porter-Cable Machine Co., 1725 N. Salina St., Syracuse, N. Y.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Production Machine Co. Greenfield, Mass.
Walls Sales Corp., 96 Warren St., New York

ABRASIVE DISKS
Baker and Co., Inc., 54 Austin St., Newark, N. J.
Bay State Abrasive Products Co., Union St., Westboro, Mass.
Charles H. Besly & Co., 118-124 North Clinton St., Chicago, Ill.
Carborundum Co., Niagara Falls, N. Y.
Gardner Machine Co., Beloit, Wis.
Hanchett Mfg. Co., 906 North State St., Big Rapids, Mich.
Ideal Commutator Dresser Co., Sycamore, Ill.
Macklin Company, Jackson, Mich.
Mall Tool Company, 7740 S. Chicago Ave., Chicago, Ill.
Mid-West Abrasive Co., 3189 Beaufait St., Detroit, Mich.
Minnesota Mining & Mfg. Co., St. Paul. Minn.
Norton Company, Worcester, Mass.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Production Machine Co., Greenfield, Mass.
Racine Tool & Machine Co., 1751 State St., Racine, Wis.
Sterling Grinding Wheel Co., Broad Ave., Tiffin, Ohio
Walls Sales Corp., 96 Warren St., New York
White Dental Mfg. Co., S. S. Philadelphia, Pa.

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American Foundry Equipment Co.
Bakelite Corp., Bound Brook, N. J.
Carborundum Co., Niagara Falls, N. Y.
General Plastics, Inc., North Tonawanda, N. Y.
Mica Inst. Co., 10 Arrow St., Camb'ge, Mass.
Minnesota Mining & Mfg. Co., St. Paul, Minn.
Norton Company, Worcester, Mass.

ABRASIVE PAPER AND CLOTH
Carborundum Co., Niagara Falls, N. Y.
Mid-West Abrasive Co., 3189 Beaufait St., Detroit, Mich.
Minnesota Mining & Mfg. Co., St. Paul, Minn.
Norton Company, Worcester, Mass.
Walls Sales Corp., 96 Warren St., New York

ABRASIVE STEEL SHOT
American Foundry Equipment Co., Mishawaka, Ind.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia, Pa.

ACETYLENE
Air Reduction Sales Co., 60 East 42nd St., New York, N. Y.

ACETYLENE GENERATING MACHINES
Air Reduction Sales Co., 60 East 42nd St., New York, N. Y.
Linde Air Products Co., 30 E. 42nd St., N. Y. C.

ACCUMULATORS, Hydraulic
Baldwin-Southwark Corp., Paschall P. O., Station, Philadelphia, Pa.
Chambersburg Engineering Co., Chambersburg, Pa.
Dunning & Boschert Press Co., Inc., 390 W. Water St., Syracuse, N. Y.
Elmes Engineering Wks., Chas. F., 1001 Fulton St., Chicago, Ill.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Hydraulic Press Mfg. Co., Mt. Gilead, Ohio.
Lake Erie Engrg. Corp. Kenmore Station, Buffalo, N. Y.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
New Britain-Gridley Machine Co., 140 Chestnut St., New Britain, Conn.
Tomkins-Johnson Co., 615 N. Mechanic St., Jackson, Mich.
Watson-Stillman Co., New York, N. Y.
Williams, White & Co., Moline, Ill.

AIR DRIERS
Surface Combustion Corp., Toledo, Ohio

ADAPTORS
Binks Mfg. Co., 3114 Carrol Ave., Chicago, Ill.
Brown & Sharpe Mfg. Co., Providence, R. I.
Hardinge Brothers, Inc., Elmira, N. Y.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capital Ave., Hartford, Conn.
Tomkins-Johnson Co., 615 N. Mechanic St., Jackson, Mich.
Union Twist Drill Co., Athol, Mass.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio.
Westcott Chuck Co., 118 E. Walnut St., Oneida, N. Y.

AIR FILTERS
American Foundry Equipment Co., Mishawaka, Ind.
Bay State Abrasive Products Co., Union St., Westboro, Mass.
Binks Mfg. Co., 3114 Carrol Ave., Chicago, Ill.
Cuno Engrg. Corp., Meriden, Conn.
Curtis Pneumatic Machinery Co., 1924 Kienler Ave., St. Louis, Mo.
Felters Co. Inc., South St., Boston, Mass.
Marshalltown Mfg. Co., 900 E. Nevada St., Marshalltown, Iowa.
Norton Company, Worcester, Mass.
Standard Electrical Tool Co., 1940 West 8th St., Cincinnati, Ohio.

AIR HOISTS (see Hoists Air)

AIR TANKS AND CYLINDERS
Binks Mfg. Co., 3114 Carrol Ave., Chicago, Ill.
Chicago Pneumatic Tool Co., 6 E. 44th St., N. Y. C.
Curtis Pneumatic Machinery Co., 1924 Kienler Ave., St. Louis, Mo.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Ingersoll-Rand Co., 11 Broadway, New York
O. C. Keckley Co., 567 Washington Blvd., Chicago, Ill.
National Tube Co., 1802 Frick Bldg., Pittsburgh, Pa.
Savage Co., W. J. Clinch Ave. and Tenth St., Knoxville, Tenn.
Tomkins-Johnson Co., The, 615 N. Mechanic St., Jackson, Mich.

AIR TOOLS (see Grinders, Pneumatic, and Drills, Portable Pneumatic)

ALLOYS, Abrasion Resistant
Carboloy Co., 2989 E. Jefferson Ave., Detroit, Mich.
Haynes-Stellite Co., Harrison & Lindsay Sts., Kokomo, Ind.

ALLOYS, Aluminum
Aluminum Co. of America, Pittsburgh, Pa.

ALLOYS, Beryllium
Beryllium Corp. of Pennsylvania, Reading, Pa.

ALLOYS, Copper
A. Allan & Son, 601-609 Bergen St., Harrison, N. J.
American Brass Co., Waterbury, Conn.
Ampco Metal Co., 3830 W. Burnham St., Milwaukee, Wis.
Bunting Brass & Bronze Co., 715 Spencer St., Toledo, Ohio
Colmonoy Inc., P. O. Box 977, Los Nietos, Calif.
Driver-Harris Co., Harrison, N. J.
Johnson Bronze Co., 100 S. Mill St., New Castle, Pa.
Revere Copper & Brass Corp., 230 Park Ave., New York, N. Y.

ALLOYS, Copper-Silicon
American Brass Co., Waterbury, Conn.

ALLOYS, Corrosion Resistant
Aluminum Co. of America, Pittsburgh, Pa.
American Brass Co., Waterbury, Conn.
Ampco Metal Co., 3830 W. Burnham St., Milwaukee, Wis.
Bethlehem Steel Co., Bethlehem, Pa.
Bunting Brass & Bronze Co., 715 Spencer St., Toledo, Ohio
Carboloy Co., 2989 E. Jefferson Ave., Detroit, Mich.
Carnegie-Illinois Steel Corp., Pittsburgh, Pa.
Carpenter Steel Co., 109 W. Bern St., Reading, Pa.
Colmonoy, Inc., P. O. Box 977, Los Nietos, Calif.
Columbia Tool Steel Co., 425 E. 14th St., Chicago, Ill.
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.
Driver-Harris Co., Harrison, N. J.
Firth-Sterling Steel Co., McKeesport, Pa.
Haynes Stellite Co., Kokomo, Ind.
Latrobe Electric Steel Co., 2626 S. Ligonier St., Latrobe, Pa.
Ludlum Steel Co., Lock Box 38, Watervliet, N. Y.
Michigan Steel Casting Co., 1986 Guden St., Detroit, Mich.
Pittsburgh Steel Co., Union Trust Bldg., Pittsburgh, Pa.
Republic Steel Corp., Republic Bldg., Cleveland, Ohio
Revere Copper & Brass Corp., 230 Park Ave., New York, N. Y.
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Timken Steel & Tube Div. Timken Roller Bearing Co., Canton, Ohio.
Universal Engineering Co., Frankenmuth, Mich.
Universal Steel Co., Bridgeville, Pa.

ALLOYS, Heat Resistant
Bunting Brass & Bronze Co., 715 Spencer St., Toledo, Ohio
Carnegie-Illinois Steel Corp., Pittsburgh, Pa.
Carpenter Steel Co., 109 W. Bern St., Reading, Pa.
Colmonoy Inc., P. O. Box 977, Los Nietos, Calif.
Columbia Tool Steel Co., 425 E. 14th St., Chicago, Ill.
Crucible Steel Co., of America, 405 Lexington Ave., New York, N. Y.
Driver-Harris Co., Harrison, N. J.
Haynes Stellite Co., Kokomo, Ind.
Heppenstall Co., 4620 Hatfield St., Pitts., Pa.
Hoskins Mfg. Co., 4445 Lawton Ave., Detroit, Mich.
Jessop Steel Co., Washington, Pa.
Latrobe Electric Steel Co., 2626 S. Ligonier St., Latrobe, Pa.
Republic Steel Corp., Republic Bldg., Cleveland, Ohio
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Timken Steel & Tube Div. Timken Roller Bearing Co., Canton, Ohio
Universal Steel Co., Bridgeville, Pa.

ALLOYS, Low-Temperature Melting
Bunting Brass & Bronze Co., 715 Spencer St., Toledo, Ohio
Cerro de Pasco Copper Corp., 44 Wall St., New York, N. Y.
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.

ALLOYS, Phosphor Bronze
American Brass Co., Waterbury, Conn.
Bunting Brass & Bronze Co., 715 Spencer St., Toledo, Ohio
Driver-Harris Co., Harrison, N. J.
Revere Copper & Brass Corp., 230 Park Ave., New York, N. Y.
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.

ALLOYS, Silico-Manganese
Anchor Drawn Steel Co., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carpenter Steel Co., 109 W. Bern St., Reading, Pa.
Colonial Steel Co., Pittsburgh, Pa.
Latrobe Electric Steel Co., 2626 S. Ligonier St., Latrobe, Pa.
Vanadium Alloys Steel Co., 2400 Grant Bl., Pittsburgh, Pa.

ALLOYS, Steel
Anchor Drawn Steel Co., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh, Pa.
Carpenter Steel Co., 109 W. Bern St., Reading, Pa.
Colmonoy, Inc., P. O. Box 977, Los Nietos, Calif.
Colonial Steel Co., Pittsburgh, Pa.
Columbia Tool Steel Co., 425 E. 14th St., Chicago, Ill.
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.
Disston & Sons, Inc., Henry, Tacony, Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Heppenstall Co., 4620 Hatfield St., Pitts., Pa.
Jessop Steel Co., Washington, Pa.
Latrobe Electric Steel Co., 2626 S. Ligonier St., Latrobe, Pa.
Ludlum Steel Co., Lock Box 38, Watervliet, N. Y.
Pittsburgh Steel Co., Union Trust Bldg., Pittsburgh, Pa.
Republic Steel Corp., Republic Bldg., Cleveland, Ohio
Jos. T. Ryerson & Son, Inc., 2558 W. 16th St., Chicago, Ill
Timken Steel & Tube Div., Timken Roller Bearing Co., Canton, Ohio
Universal Steel Co., Bridgeville, Pa.
Vanadium Alloys Steel Co., 2400 Grant Pl., Pittsburgh, Pa.

ALLOYS, Steel, Cold Finished
Bliss & Laughlin Inc., Harvey, Ill. & Buffalo, N. Y.
Firth-Sterling Steel Co., McKeesport, Pa.
Ideal Foundry & Machine Co., Beaver Falls, Pa.
Jessop Steel Co., Washington, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Jos. T. Ryerson & Son., Inc., 2558 W. 16th St., Chicago, Ill.
Latrobe Electric Steel Co., 2626 S. Ligonier St., Latrobe, Pa.
Pittsburgh Steel Co., Union Trust Bldg., Pittsburgh, Pa.
Timken Steel & Tube Div. Timken Roller Bearing Co., Canton, Ohio.
Union Drawn Steel Co., Massillon, Ohio
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

ALLOYS, Tantalum
Carboloy Co., Inc., 2989 E. Jefferson Ave., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Vanadium, Alloys Steel Co., 2400 Grant Pl., Pittsburgh, Pa.
Wesson Co., Detroit, Mich.

ALLOYS, Titanium
Carboloy Co., Inc., 2989 E. Jefferson Ave., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Wesson Co., Detroit, Mich.

ALLOYS, Tungsten
Anchor Drawn Steel Co., Pittsburgh, Pa.
Carboloy Co., Inc., 1989 E. Jefferson Ave., Detroit, Mich.
Colonial Steel Co., Pittsburgh, Pa.
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.
Firth-Sterling Steel Co., McKeesport, Pa.
Haynes Stellite Co., Kokomo, Ind.
Latrobe Electric Steel Co., 2626 S. Ligonier St., Latrobe, Pa.
Super Tool Company, 356 E. Congress St., Detroit, Mich.
Tungsten Electric Corp., New York City
Vanadium Alloys Steel Co., 2400 Grant Pl., Pittsburgh, Pa.
Wesson Co., Detroit, Mich.

ALLOYS, Vanadium
Anchor Drawn Steel Co., Pittsburgh, Pa.
Carboloy Co., Inc., 2985 E. Jefferson Ave., Detroit, Mich.
Carpenter Steel Co., 109 W. Bern St., Reading, Pa.
Colonial Steel Co., Pittsburgh, Pa.
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.
Jessop Steel Co., Washington, Pa.
Latrobe Electric Steel Co., 2626 S. Ligonier St., Latrobe, Pa.
Vanadium Alloys Steel Co., 2400 Grant Pl., Pittsburgh, Pa.

ALLOYS, Zinc
New Jersey Zinc Co., 160 Front St., New York City
Revere Copper & Brass Corp., 230 Park Ave., New York N. Y.

ALUMINUM
Aluminum Co. of America, Pittsburgh, Pa.
Revere Copper & Brass Corp., 230 Park Ave., New York, N. Y.

AMPLIFIERS
Cimatool Co., Dayton, Ohio
Pratt & Whitney Co., 436 Capitol Ave., Hartford, Conn.
George Scherr Co., Inc., 128 Lafayette St., New York
Sheffield Gage Corp., Dayton, Ohio
Standard Gage Co., Inc., Poughkeepsie, N. Y.
Van Keuren Co., 12 Copeland St., Watertown, Mass.

ANGLE PLATES
Cleveland Universal Jig Co., 13325 St. Clair Ave., Cleveland, Ohio
Mica Instrument Co., 10 Arrow St., Cambridge, Mass.
Pratt & Whitney Div., Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Taft-Pierce Mfg. Co., The, 32 Mechanic Ave., Woonsocket, R. I.

ANGLES, Beams, Channels and Tees
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Republic Steel Corp., Republic Bldg., Cleveland, Ohio
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Savage Co., W. J., Clinch Ave. and Tenth St., Knoxville, Tenn.

ANGLES, Beams, Channels and Tees, Aluminum
Aluminum Co. of America, Pittsburgh, Pa.
Revere Copper & Brass Corp., 230 Park Ave., New York, N. Y.

ANNEALING, Baths
Holden Co., A. F., 200 Winchester Ave., New Haven, Conn.

ANODES, All Types
American Brass Co., Waterbury, Conn.
Baker & Co., Inc., 54 Austin St., Newark, N. J.
Revere Copper & Brass Corp., 230 Park Ave., New York, N. Y.

ARBOR PRESSES (see Presses, Arbor)

ARBORS AND MANDRELS
Brown & Sharpe Mfg. Co., Providence, R. I.
Butterfield Div. (Union Twist Drill Co.), Derby Line, Vt.
Carboloy Co., Inc., 2989 E. Jefferson Ave., Detroit, Mich.
Cincinnati Milling Mach. Co., Cincinnati, O.
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio
Cochrane-Bly Co., 15 St. James Pl., Rochester, N. Y.
Disston & Sons, Inc., Henry, Tacony, Philadelphia, Pa.
Greenfield Tap & Die Corp., Sanderson St., Greenfield, Mass.
Illinois Tool Wks., 2501 N. Keeler Ave., Chicago, Ill.
Ingersoll Milling Machine Co., Rockford, Ill.
Jacobs Mfg. Co., 2074 Park St., Hartford, Conn.
Latrobe Electric Steel Co., 2626 S. Ligonier St., Latrobe, Pa.
McCrosky Tool Corp., 1340-80 South Main St., Meadville, Pa.
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
Production Tool Co., 6474 LeGrande Ave., Detroit, Mich.
Standard Tool Co., The, 6918 Central Ave., Cleveland, Ohio
Universal Engineering Co., Frankenmuth, Mich.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio
Westcott Chuck Co., 118 E. Walnut St., Oneida, N. Y.
Western Tool & Mfg. Co., Springfield, Ohio

BABBITT
Bunting Brass & Bronze Co., 715 Spencer St., Toledo, Ohio
Johnson Bronze Co., 100 S. Mill St., New Castle, Pa.
Moccasin Bushing Co., Chattanooga, Tenn.
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Savage Co., W. J., Clinch Ave. and Tenth St., Knoxville, Tenn.
Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa.

BALANCING MACHINES
Gisholt Machine Co., 1201 E. Washington Ave., Madison, Wis.
Globe Tool & Engineering Co., 420 Davis Ave., Dayton, Ohio
Norton Co., 1 New Bond St., Worcester, Mass.
Taylor Mfg. Corp., 2330 Clybourn St., Milwaukee, Wis.
Tinius Olsen Testing Machine Co., 500 N. 12th St., Philadelphia, Pa.

BALANCING TOOLS
Anderson Bros. Mfg. Co., Rockford, Ill.
Chicago Pneumatic Tool Co., 6 East 44th St., New York, N. Y.
Globe Tool & Engineering Co., 420 Davis Ave., Dayton, Ohio
Tinius Olsen Testing Machine Co., 500 N. 12th St., Philadelphia, Pa.
Sundstrand Machine Tool Co., Rockford, Ill.
Taft-Peirce Mfg. Co., The, 32 Mechanic Ave., Woonsocket, R. I.

BALING PRESSES
Continental Machine Specialties, Inc., Minneapolis, Minn.

BALL HEADERS, Hot and Cold
National Machinery Co., Greenfield St., Tiffin, Ohio

BALLS, Brass, Bronze and Steel, Etc.
Carnegie-Illinois Steel Corp., Pittsburgh, Pa.
Hoover Steel Ball Co., Ann Arbor, Mich.
New Departure Div. General Motors Corp., Bristol, Conn.
Nice Ball Bearing Co., 30th and Nicetown Lane, Philadelphia, Pa.
S. K. F. Industries, Inc., Front St. & Erie Ave., Philadelphia, Pa.
Waterbury Steel Ball Co., Poughkeepsie, N. Y.

BALLS, Brinell, Cemented Carbide
Carboloy Co., Inc., 2989 E. Jefferson Ave., Detroit, Mich.

BARRELS, Fibre
Continental Diamond Fibre Co., Newark, Del.

BARRELS, Tumbling and Burnishing
American Foundry Equipment Co., Mishawaka, Ind.
Baird Machine Co., Bridgeport, Conn.
Globe Machine & Stamping Co., 1259 West 76th St., Cleveland, Ohio
Ransohoff, Inc., Carthage, Cincinnati, Ohio
Waterbury Steel Ball Co., Poughkeepsie, N. Y.

BARS, Alloy
Aluminum Co. of America, Pittsburgh, Pa.
American Brass Co., Waterbury, Conn.
Anchor Drawn Steel Co., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburg, Pa.
Carpenter Steel Co., 109 W. Bern St., Reading, Pa.
Colonial Steel Co., Pittsburgh, Pa.
Columbia Tool Steel Co., 425 E. 14th St., Chicago, Ill.
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.
Driver-Harris Co., Harrison, N. J.
Firth-Sterling Steel Co., McKeesport, Pa.
Heppenstall Co., 4620 Hatfield St., Pittsburgh
Jessop Steel Co., Washington, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Latrobe Electric Steel Co., 2626 S. Ligonier St., Latrobe, Pa.
Ludlum Steel Co., Lock Box 38, Watervliet, N. Y.
Republic Steel Corp., Republic Bldg., Cleveland, Ohio
Revere Copper & Brass Corp., 230 Park Ave., New York, N. Y.
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Timken Steel & Tubes, Inc., Canton, Ohio
Universal Steel Co., Bridgeville, Pa.
Vanadium Alloys Steel Co., 2400 Grant Pl., Pittsburgh, Pa.

BARS, Aluminum
Aluminum Co. of America, Pittsburgh, Pa.

BARS, Boring (see Boring Bars)

BARS, Brass, Bronze and Copper
American Brass Co., Waterbury, Conn.
Ampco Metal Co., 3830 W. Burnham St., Milwaukee, Wis.
Bunting Brass & Bronze Co., 715 Spencer St., Toledo, Ohio
Johnson Bronze Co., 100 S. Mill St., New Castle, Pa.
Moccasin Bushing Co., Chattanooga, Tenn.
Revere Copper & Brass Corp., 230 Park Ave., New York, N. Y.
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.

BARS, Cold Drawn
Anchor Drawn Steel Co., Pittsburgh, Pa.
Bliss & Laughlin Inc., Harvey, Ill. and Buffalo, N. Y.
Carpenter Steel Co., 109 W. Bern St., Reading, Pa.
Colonial Steel Co., Pittsburgh, Pa.
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.
Driver-Harris Co., Harrison, N. J.
Jessop Steel Co., Washington, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Latrobe Electric Steel Co., 2626 S. Ligonier St., Latrobe, Pa.
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Savage Co., W. J., Clinch Ave. and Tenth St., Knoxville, Tenn.
Timken Steel & Tubes, Inc., Canton, Ohio
Union Drawn Steel Co., Massillon, Ohio
Universal Steel Co., Bridgeville, Pa.
Vanadium Alloy Steel Co., 2400 Grant Pl., Pittsburgh, Pa.
Wyckoff Drawn Steel Co., Box 1256 First National Bank Bldg., Pitts., Pa.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

BARS, Sine
Ford Motor Co., Johansson Div., 3074 Schaefer Rd., Dearborn, Mich.

BARS, Steel
Anchor Drawn Steel Co., Pittsburgh, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh, Pa.
Carpenter Steel Co., 19 W. Bern St., Reading, Pa.
Colonial Steel Co., Pittsburgh, Pa.
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.
Disston & Sons, Inc., Henry, Tacony, Philadelphia, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Latrobe Electric Steel Co., 2626 S. Ligonier St., Latrobe, Pa.
Republic Steel Corp., Republic Bldg., Cleveland, Ohio.
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Savage Co., W. J., Clinch Ave. and Tenth St., Knoxville, Tenn.
Timken Steel & Tubes, Inc., Canton, Ohio
Universal Steel Co., Bridgeville, Pa.
Vanadium Alloys Steel Co., 2400 Grant Pl., Pittsburgh, Pa.

BATTERY CHARGERS
Baker-Raulang Co., 2164 W. 25th St., Cleveland, Ohio
General Electric Co., Schenectady, N. Y.
Ward Leonard Elec. Co., Mount Vernon, N. Y.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

BATTERIES, Storage, Elec. Industrial Truck and Locomotives
Electric Storage Battery Co., Allegheny Ave., and 19th St., Phila., Pa.

BATHS, Heat Treating
Holden Co., A. F., 200 Winchester Ave., New Haven, Conn.

BEAMS (see Angles, Beams, Channels and Tees)

BEAMS, Aluminum (see Angles, Beams, Channels and Tees)

BEARING, Bluing
Dayton Rogers Co., Minneapolis, Minn.
Dykem Co., The, 2301 N. 11th St., St. Louis, Mo.

BEARING SHIMS
Laminated Shim Co., 21-14 44th Ave., Long Island City, N. Y.
National Motor Bearing Co., 1100 78th Ave., Oakland, Cal.

BEARINGS, Babbitt
Bunting Brass & Bronze Co., 715 Spencer St., Toledo, Ohio
Johnson Bronze Co., 100 S. Mill St., New Castle, Pa.
Power Transmission Council, 74 State St., Boston, Mass.
Savage Co., W. J. Clinch Ave. and Tenth St., Knoxville, Tenn.

BEARINGS, Ball
Ahlberg Bearing Co., 317 E. 29th St., Chicago, Ill.
Bantam Ball Bearing Co., 3702 W. Sample St., South Bend, Ind.
Bearings Co., of America 501 Harrisburg Ave. Lancaster, Pa.
Fafnir Bearing Co., New Britain, Conn.
Federal Bearings Co., Inc., The, Poughkeepsie, N. Y.
Hoover Steel Ball Co. Arm Arbor, Mich.
Marlin-Rockwell Corp., 402 Chandler St., Jamestown, N. Y.
New Departure Div. General Motors Corp., Bristol, Conn.
Norma - Hoffman Bearings Corp., Stamford, Conn.
Power Transmission Council, 74 State St., Boston, Mass.
S. K. F. Industries, Inc., Philadelphia, Pa.
Savage Co., W. J., Clinch Ave. and Tenth St., Knoxville, Tenn.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
Torrington Co., The, Field St., Torrington, Conn.

BEARINGS, Bronze
A. Allan & Son, 601-609 Bergen St., Harrison, N. J.
Ampco Metal Co., 3830 W. Burnham St., Milwaukee, Wis.
Bunting Brass & Bronze Co., 715 Spencer St., Toledo, Ohio
Carlyle Johnson Machine Co., 52 Main St., Manchester, Conn.
Johnson Bronze Co., 100 S. Mill St., New Castle, Pa.
Moccasin Bushing Co., Chattanooga, Tenn.
Power Transmission Council, 74 State St., Boston, Mass.
Savage Co., W. J., Clinch Ave. and Tenth St., Knoxville, Tenn.

BEARINGS, Die Cast
Power Transmission Council, 74 State St., Boston, Mass.
Stewart Die Casting Corp., Chicago, Ill.

BEARINGS, Graphited
Bunting Brass & Bronze Co., 715 Spencer St., Toledo, Ohio.

BEARINGS, Lineshaft
Ahlberg Bearing Co., 317 E. 29th St., Chicago, Ill.
Bunting Brass & Bronze Co., 715 Spencer St., Toledo, Ohio
Dodge Mfg. Corp., Mishawaka, Ind.
Fafnir Bearing Co., New Britain, Conn.
Federal Bearings Co., Inc., The, Poughkeepsie, N. Y.
Hanson Clutch & Machinery Co., Tiffin, Ohio
Hyatt Bearings Div. General Motors Corp., P. O. Box 476, Newark, N. J.
Link-Belt Co., 2410 W. 18th St., Chicago, Ill.
Marlin-Rockwell Corp., 402 Chandler St., Jamestown, N. Y.
Norma-Hoffman Bearings Corp., Stamford, Conn.
Power Transmission Council, 74 State St., Boston, Mass.
S. K. F. Industries, Inc., Philadelphia, Pa.
Savage Co., W. J., Clinch Ave. and Tenth St., Knoxville, Tenn.
Schatz Mfg. Co., Poughkeepsie, N. Y.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.
Standard Pressed Steel Co., Jenkintown, Pa.
Waterbury Steel Ball Co., Poughkeepsie, N. Y.

BEARINGS, Needle
Bantam Ball Bearing Co., 3702 W. Sample St., South Bend, Ind.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
Roller Bearing Co. of America, Trenton, N. J.
S. K. F. Industries, Inc., Philadelphia, Pa.
Torrington Co., The, Field St., Torrington, Conn.

BEARINGS, Oilless
Bunting Brass & Bronze Co., 715 Spencer St., Toledo, Ohio
Carlyle Johnson Machine Co., 52 Main St., Manchester, Conn.
Continental Diamond Fibre Co., Newark, Del.
Formica Insulation Co., 4614 Spring Grove Ave., Cincinnati, Ohio
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., Passic, N. J.
Power Transmission Council, 74 State St., Boston, Mass.

BEARINGS, Phenolic Laminated
Bakelite Corp., Bound Brook, N. J.
Continental Diamond Fibre Co., Newark, Del.
Formica Insulation Co., 4614 Spring Grove Ave., Cincinnati, Ohio
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Synthane Corp., Oaks, Pa.

BEARINGS, Quill
Bantam Ball Bearing Co., 3702 W. Sample St., South Bend, Ind.
Dodge Mfg. Corp., Mishawaka, Ind.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
S. K. F. Industries, Inc., Philadelphia, Pa.
Torrington Co., The, Field St., Torrington, Conn.

BEARINGS, Roller
Ball & Roller Bearing Co., Danbury, Conn.
Bantam Ball Bearing Co., 3702 W. Sample St., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Bearings Div. General Motors Corp., P. O. Box 476, Newark, N. J.
Latrobe Electric Steel Co., 2626 Ligonier St., Latrobe, Pa.
McGill Mfg. Co., Valparaiso, Ind.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
Power Transmission Council, 74 State St., Boston, Mass.
Roller Bearing Co. of America, Trenton, N. J.
S. K. F. Industries, Inc., Philadelphia, Pa.
Savage Co., W. J., Clinch Ave. and Tenth St., Knoxville, Tenn.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.
Torrington Co., The, Field St., Torrington, Conn.

BEARINGS, Self-Aligning Ball
S. K. F. Industries, Front St. and Erie Ave., Philadelphia, Pa.

BEARINGS, Self-Aligning Roller
Shaefer Bearings Corp., 35 E. Wacker Drive, Chicago, Ill.

BEARINGS, Self Sealed Ball
Fafnir Bearing Co., New Britain, Conn.
Federal Bearings Co., Inc., Poughkeepsie, N. Y.
Marlin-Rockwell Corp., 402 Chandler St., Jamestown, N. Y.
New Departure Div. General Motors Corp., Bristol, Conn.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
Schatz Mfg. Co., Poughkeepsie, N. Y.

BEARINGS, Tapered Roller
Bantam Ball Bearing Co., 3702 W. Sample St., South Bend, Ind.
Savage Co., W. J., Clinch Ave. and Tenth St., Knoxville, Tenn.
Timken Roller Bearing Co., Canton, Ohio

BEARINGS, Thrust
Bantam Ball Bearing Co., 3702 W. Sample St., South Bend, Ind.
Farfir Bearing Co., New Britain, Conn.
Marlin-Rockwell Corp., 402 Chandler St., Jamestown, N. Y.
New Departure Div. General Motors Corp., Bristol, Conn.
Nice Ball Bearing Co., 30th and Nicetown Lane, Philadelphia, Pa.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
S. K. F. Industries, Inc., Philadelphia, Pa.
Savage Co., W. J., Clinch Ave. and Tenth St., Knoxville, Tenn.
Schaltz Mfg. Co., Poughkeepsie, N. Y.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.
Torrington Co., The, Field St., Torrington, Conn.

BELT CEMENT, Dressing and Fillers
Atkins & Co., E. C., 424 So. Illinois St., Indianapolis, Ind.
Chicago Rawhide Mfg. Co., Chicago, Ill.
Desmond-Stephen Mfg. Co., Urbana, Ohio.
F. Goodrich Co., 576 South Main St., Akron, Ohio.
Jos. Dixon Crucible Co., Jersey City, N. J.
Graton & Knight Co., 356 Franklin St., Worcester, Mass.
Houghton & Co., E. F., Philadelphia, Pa.
Power Transmission Council, 74 State St., Boston, Mass.
Rhoads & Sons, J. E., 35 North Sixth St., Philadelphia, Pa.
Savage Co., W. J., Clinch Ave. and Tenth St., Knoxville, Tenn.

BELT FASTENERS, Lacing and Clamps
Bristol Co., Waterbury, Conn.
Chicago Rawhide Mfg. Co., Chicago, Ill.
Graton & Knight Co., 356 Franklin St., Worcester, Mass.
Greene, Tweed & Co., 109 Duane St. New York, N. Y.
Power Transmission Council, 74 State St., Boston, Mass.
Republic Steel Corp., Republic Bldg., Cleveland, Ohio
Rhoades & Sons, J. E., 35 North Sixth St., Philadelphia, Pa.
Savage Co., W. J., Clinch Ave. and Tenth St., Knoxville, Tenn.
Shippert Mfg. Co., 414 S. Gelena Ave., Dixon, Ill.

BELT SCRAPERS
Atkins & Co., E. C., 424 So. Illinois St., Indianapolis, Ind.
Graton & Knight Co., 356 Franklin St., Worcester, Mass.
Power Transmission Council, 74 State St., Boston, Mass.
Rhoads & Sons, J .E., 35 North Sixth St., Philadelphia, Pa.

BELT SHIFTERS
Diamond Machine Co., Providence, R. I.
Power Transmission Council, 74 State St., Boston, Mass.
Ready Tool Co., Iranistan and Railroad Aves., Bridgeport, Conn.

BELT WAX
Atkins & Co., E. C., 424 So. Illinois St., Indianapolis, Ind.
Chicago Rawhide Mfg. Co., Chicago, Ill.
Power Transmission Council, 74 State St., Boston, Mass.

BELTING CHAIN **(see Chains, Transmission)**

BELTING, Flat fabric
Gilmer Co., L. H., Tacony, Philadelphia, Pa.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., Passaic, N. J.
Wickwire Spencer Steel Co., New York City

BELTING, Leather
Chicago Rawhide Mfg. Co., Chicago, Ill.
Graton & Knight Co., 356 Franklin St., Worcester, Mass.
Greene, Tweed & Co., 109 Duane St., New York, N. Y.
Houghton & Co., E. F., Philadelphia, Pa.
Power Transmission Council, 74 State St., Boston, Mass.
Rhoads & Sons, J. E., 35 North Sixth St., Philadelphia, Pa.
Savage Co., W. J., Clinch Ave. and Tenth St., Knoxville, Tenn.

BELTING, Metal, Conveyor, High & Low Temperature
Wickwire Spencer Steel Co., New York City

BELTING, Rounded Leather
Chicago Rawhide Mfg. Co., Chicago, Ill.
Graton & Knight Co., 356 Franklin St., Worcester, Mass.
Greene, Tweed & Co., 109 Duane St., New York, N. Y.
Houghton & Co., E. F., Philadelphia, Pa.
Rhoads & Sons, E. F., Philadelphia, Pa. delphia, Pa.
Savage Co., W. J., Clinch Ave. and Tenth St., Knoxville, Tenn.

BELTING, Rubber and Fabric
Dayton Rubber Mfg. Co., The, Dayton, Ohio
Gates Rubber Co., Denver, Colo.
Gilmer Co., L. H., Tacony, Philadelphia, Pa.
B. F. Goodrich Co., 576 South Main St., Akron, Ohio
Graton & Knight Co., 356 Franklin St., Worcester, Mass.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., Passaic, N. J.
Power Transmission Council, 74 State St., Boston, Mass.
Republic Rubber Co., Youngstown, Ohio
Savage Co., W. J., Clinch Ave. and Tenth St., Knoxville, Tenn.

BELTING, V.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Dayton Rubber Mfg. Co., The, Dayton, Ohio
Delta Mfg. Co., Vienna Ave., Milwaukee, Wis.
Dodge Mfg. Corp., Mishawaka, Ind.
Gates Rubber Co., Denver, Colo
Gilmer Co., L. H. Tacony, Philadelphia, Pa.
B. F. Goodrich Co., 576 South Main St., Akron, Ohio
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., Passaic, N. J.
Republic Rubber Co., Youngstown, Ohio
Rhoads & Sons, J. E., 35 N. Sixth St., Philadelphia, Pa.
Savage Co., W. J. Clinch Ave. and Tenth St., Knoxville, Tenn.

BENCH CENTERS
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
Sundstrand Machine Tool Co., Rockford, Ill.
Taft-Peirce Mfg. Co., The, 32 Mechanic Ave., Woonsocket, R. I.

BENCH PLATES
A. B. C. Products, 11952 Montana Ave., West Los Angeles, Calif.

BENCHES AND BENCH LEGS
Boice Crane Co., Toledo, Ohio
Delta Mfg. Co., Vienna Ave., Milwaukee, Wis.
Hardinge Brothers, Inc., Elmira, N. Y.
Pollard Bros. Mfg. Co., 4444 N. Knox Ave., Chicago, Ill.
Standard Pressed Steel Co., Jenkintown, Pa.
Western Tool & Mfg. Co., Springfield, Ohio
Whitney Metal Tool Co., Rockford, Ill.

BENDING AND STRAIGHTENING MACHINES
Baldwin-Southwark Corp., Paschall P. O. Station, Philadelphia, Pa.
Bertsch & Co., Cambridge City, Ind.
Buffalo Forge Co., 448 Broadway, Buffalo,
Champion Blower & Forge Co., Harrisburg Ave., Lancaster, Pa.
Cleveland Punch & Shear Works, 3917 St. Clair Ave., Cleveland, O.
Consolidated Machine Tool Corp., Rochester, N. Y.
Elmes Engineering Works, Chas. F., 1001 Fulton St., Chicago, Ill.
Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill.
General Mfg. Co., 6436 Fransworth Ave., Detroit, Mich.
Hendley & Whittemore Co., 10 S. State St., Beloit, Wis.
Hydraulic Press Mfg. Co., Mt. Gilead, Ohio
Index Machinery Corp., 49 Central Ave., Cincinnati, Ohio
Marburg Brothers, Inc., 90 West St., New York, N. Y.
Rock River Machine Co., Janesville, Wis.
Schatz Mfg. Co., Poughkeepsie, N. Y.
W. A. Schuyler, 250 W. 57th St., N. Y. C.
United Engry. & Fdry. Co., Pittsburgh, Pa.
Watson-Stillman Co., New York, N. Y.
Wickes Bros., 512 No. Water St., Saginaw, Mich.
Williams, White & Co., Moline, Ill.

BERYLLIUM
Beryllium Corp. of Pennsylvania, Reading, Pa.

BINS
Berger Mfg. Co. (Sub. of Republic Steel Corp.), Canton, Ohio
General Fireproofing Co., Youngstown, Ohio
Lyon Metal Products Co., Aurora, Ill.
•Yale & Towne Mfg. Co., Philadelphia Div., 4530 Tacony St., Phila., Pa.

BITS, Machine (see Tool Bits)

BLOCKS ANGLE
Ford Motor Co., Johansson Div., 3674 Schaefer Rd., Dearborn, Mich.
Sheffield Gage Corp., Dayton, Ohio
Standard Gage Co., Inc., Poughkeepsie, N. Y.

BLOCKS, Die
Heppenstall Co., 4620 Hatfield St., Pittsburgh, Pa.
Jessop Steel Co., Washington, Pa.

BLOCKS, Chain (see Hoists, Chain)

BLOCKS, Pillow (see Pillow Blocks)

BLOCKS, Precision Gage
Brown & Sharpe Mfg. Co., Providence, R. I.
Ford Motor Co., Johansson Div., 3674 Schaefer Rd., Dearborn, Mich.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
George Scherr Co., Inc., 128 Lafayette St., N. Y. C.
Van Keuren Co., The, 12 Copeland St., Watertown, Mass.

BLOW PIPES, Gas-Cutting
Air Reduction Sales Co., 60 E. 42nd St., New York, N. Y.
American Swiss File & Tool Co., Elizabeth, N. J.
Linde Air Products Co., 30 E. 42nd St., N. Y.

BLOW PIPES, Hand and Stand
American Gas Furnace Co., Elizabeth, N. J.
Linde Air Products Co., 30 E. 42nd St., N. Y. C.

BLOW TORCHES
Air Reduction Sales Co., 60 E. 42nd St., New York, N. Y.
American Gas Furnace Co., Elizabeth, N. J.
Atkins & Co., E. C., 424 So. Illinois St., Indianapolis, Ind.
Linde Air Products Co., 30 E. 42nd St., N. Y.

BLOWERS AND FANS
American Gas Furnace Co., Elizabeth, N. J.
Bendix Products Corp., South Bend, Ind.
Buffalo Forge Co., 448 Broadway, Buffalo,
Champion Blower & Forge Co., Harrisburg Ave., Lancaster, Pa.
Continental Diamond Fibre Co., Newark, Dela.
DeLaval Steam Turbine Co., Trenton, N. J.
Emerson Electric Mfg. Co., 2001 Washington Ave., St. Louis, Mo.
General Electric Co., Schenectady, N. Y.
Ingersoll-Rand Co., 11 Broadway, New York,
Janette Mfg. Co., 536 W. Monroe St., Chicago, Ill.
North American Mfg. Co., 2910 E. 75th St., Cleveland, Ohio
Savage Co., W. J., Clinch Ave. and Tenth St., Knoxville, Tenn.
Signal Electric Mfg. Co., Menominee, Mich.
Spencer Turbine Co., Hartford, Conn.
Standard Electrical Tool Co., 1940 W. 8th St., Cincinnati, Ohio
Strong, Carlisle & Hammond Co., 1392 W. Third St., Cleveland, Ohio
Wagner Electric Corp., 6444 Plymouth Ave., St. Louis, Mo.

BLOWERS, Electric, Hand
Buffalo Forge Co., 448 Broadway, Buffalo,
Champion Blower & Forge Co., Harrisburg Ave., Lancaster, Pa.
Savage Co., W. J., Clinch Ave. and Tenth St., Knoxville, Tenn.
Skilsaw, Inc., 3310 Elston Ave., Chicago, Ill.
Speedway Mfg. Co., 1834 S. 52nd Ave., Cicero, Ill.
Standard Electrical Tool Co., 1940 W. 8th St., Cincinnati, Ohio

BLUEPRINTING EQUIPMENT
Ozalid Corporation, 354 Fourth Ave, New York City.
C. F. Pease Co., 862 N. Franklin St., Chicago,
Wickes Bros., 512 No. Water St., Saginaw, Mich.

BLUEPRINTING MACHINES
C. F. Pease Co., 862 N. Franklin St., Chicago,
Wickes Bros., 512 No. Water St., Saginaw, Mich.

BLUING FOR STEEL
Dayton Rogers Mfg. Co., Minneapolis, Minn.
Dykem Co., The, 2301 N. Eleventh St., St. Louis, Mo.

BLUING, Layout
Dayton Rogers Mfg. Co., Minneapolis, Minn.
Dykem Co., The, 2301 N. Eleventh St., St. Louis, Mo.

BOLT AND NUT MACHINERY
Acme Machinery Co., 4533 St. Clair Ave., Cleveland, Ohio
Ajax Mfg. Co., Euclid Branch P. O., Cleveland, Ohio
Automatic Machine Co., Bridgeport, Conn.
Cleveland Automatic Mach. Co., Ashland Rd., Cleveland, O.
Cone Automatic Machine Co., Windsor, Vt.
Eastern Machine Screw Corp., 20-40 Barclay St., New Haven, Conn.
Foote-Burt Co., The, 13000 St. Clair Ave., Cleveland, Ohio
Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill.
Landis Machine Co., Inc., Church and 5th Sts., Waynesboro, Pa.
E. J. Manville Co., Waterbury, Conn.
Murchey Machine & Tool Co., 951 Porter St., Detroit, Mich.
National Acme Co., Cleveland, Ohio
National Machinery Co., Greenfield St., Tiffin, Ohio
New Britain-Gridley Machine Co., 140 Chestnut St., New Britain, Conn.
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.

BOLT HEADING AND FORGING MACHINES
Acme Machinery Co., 4533 St. Clair Ave., N. E., Cleveland, Ohio
Ajax Mfg. Co., Euclid Branch P. O., Cleveland, Ohio
National Machinery Co., Tiffin, Ohio
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.

BOLTS AND NUTS
Aluminum Co. of America, Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Dardelet Threadlock Corp., 120 Broadway, New York
Driver-Harris Co., Harrison, N. J.
Republic Steel Corp., Republic Bldg., Cleveland, Ohio
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
J. H. Williams & Co., Inc., 75 Spring St., N. Y.

BOLTS AND NUTS, T Slot
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.

BOLT TRIMMERS
E. J. Manville Mach. Co., Waterbury, Conn.

BOOKS, Technical
McGraw Hill Book Co., Inc., New York
New Method Engineering Corp., Chicago, Ill.

BORING BARS AND HEADS
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
City Machine & Tool Works, E. 3rd at June, Dayton, Ohio
Craley Mfg. Co., C. C., P. O. Box 192, Schillington, Pa.
Davis Boring Tool Co. (Div. Larkin Packer Co.), 6200 Maple Ave., St. Louis, Mo.
Elmes Engineering Works, Chas. F., 1001 Fulton St., Chicago, Ill.
Ex-Cell-O Aircraft & Tool Corp., 1200 Oakman Blvd., Detroit, Mich.
Gairing Tool Co., 629 Lafayette Blvd., Detroit, Mich.
Gisholt Machine Co., 1201 E. Washington Ave., Madison, Wis.
Index Machinery Corp., 49 Central Ave., Cincinnati, Ohio
Ingersoll-Rand Co., 11 Broadway, New York,
E. Karelsen, Inc., 17 W. 44th St., N. Y. C.
Kelly Reamer Co., 3775 Ridge Rd., Cleveland, Ohio
Lucas Machine Tool Co., 523 E. 99th St., Cleveland, Ohio
McCrosky Tool Corp., 1340-80 S. Main St., Meadville, Pa.
Pratt & Whitney Co., 436 Capitol Ave., Hartford, Conn.
Rickert-Shafer Co., 613 W. 11th St., Erie, Pa.
Taft-Peirce Mfg. Co., The, 32 Mechanic Ave., Woonsocket, R. I.
Universal Boring Machine Co., 312 Main St., Hudson, Mass.
Universal Drafting Machine Co., 1426 W. Third St., Cleveland, Ohio
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio
Wesson Co., Detroit, Mich.
Westcott Chuck Co., 118 E. Walnut St., Oneida, N. Y.
Western Tool & Mfg. Co., Springfield, Ohio

BORING CHUCKS
Cimatool Co., E. 3rd and June, Dayton, Ohio

BORING, Drilling, and Milling Machines, Horizontal
W. F. & John Barnes Co., Rockford, Ill.
Brown & Sharpe Mfg. Co., Providence, R. I.
Bryant Machinery & Engrg. Co., 400 W. Madison St., Chicago, Ill.
Consolidated Machine Tool Corp., Rochester, N. Y.
Defiance Machine Works, Defiance, Ohio
Fitchburg Engrg. Corp., 52 Oak Hill Road, Fitchburg, Mass.
Foote-Burt Co., The, 13000 St. Clair Ave., Cleveland, Ohio
General Machinery Corp. (Niles Tool Wks. Div.), 545 N. Third St., Hamilton, Ohio
Giddings & Lewis Machine Tool Co., 142 Doty St., Fond du Lac, Wis.
G. A. Gray Company, 3611 Woodburn Ave., Cincinnati, Ohio
Hall Planetary Co., Fox St. & Abbottsford Ave., Philadelphia, Pa.
Index Machinery Corp., 49 Central Ave., Cincinnati, Ohio
Ingersoll Milling Machine Co., Rockford, Ill.
Lucas Machine Tool Co., 523 E. 99th St., Cleveland, Ohio
Moline Tool Co., 102-20th St., Moline, Ill.
Morton Mfg. Co., Muskegon Heights, Mich.
National Automatic Tool Co., S. 7th and N. Sts., Richmond, Ind.
Niles Tool Works Co., Hamilton, Ohio
Ohio Machine Tool Co., Kenton, Ohio
Rockford Drilling Machine Co., Rockford, Ill.
W. A. Schuyler, 250 W. 57th St., New York
Sellers & Co., Inc., William, 1600 Hamilton St., Philadelphia, Pa.
Snyder Tool & Eng. Co., Detroit, Mich.
Universal Boring Machine Co., 312 Main St., Hudson, Mass.

BORING, Drilling, and Milling Machines, Vertical
Barnes Drill Co., 814 Chestnut St., Rockford, Ill.
Brown & Sharpe Mfg. Co., Providence, R. I.
Consolidated Machine Tool Corp., Rochester, N. Y.
Dresses Machine Tool Co., 3366 Beekman St., Cincinnati, Ohio
Fitchburg Engrg. Corp., 52 Oak Hill Road, Fitchburg, Mass.
Foote-Burt Co., The, 13000 St. Clair Ave., Cleveland, Ohio
General Machinery Corp. (Niles Tool Wks. Div.), 545 No. Third St., Hamilton, Ohio
Giddings & Lewis Machine Tool Co., 142 Doty St., Fond du Lac, Wis.
Index Machinery Corp., 49 Central Ave., Cincinnati, Ohio
Ingersoll Milling Machine Co., Rockford, Ill.
Knight Machinery Co., W. B., 3920 W. Pine Blvd., St. Louis, Mo.
Moline Tool Co., 102-20th St., Moline, Ill.
National Automatic Tool Co., South 7th and N. Sts., Richmond, Ind.
Pratt & Whitney Co., 436 Capitol Ave., Hartford, Conn.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Rockford Drilling Machine Co., Rockford, Ill.

BORING AND TURNING MILLS, Vertical
Bullard Co., Canfield Ave., Bridgeport, Conn.
Cincinnati Planer Co., 3120 Forrer St., Oakley, Cincinnati, Ohio
Consolidated Machine Tool Corp., Rochester, N. Y.
General Machinery Corp. (Niles Tool Wks. Div.), 545 No. Third St., Hamilton, Ohio
Hall Planetary Co., Fox Street & Abbottsford Ave., Philadelphia, Pa.
King Machine Tool Co., Cincinnati, Ohio
Sellers & Co., Inc., William, 1600 Hamilton St., Philadelphia, Pa.

BORING MACHINES, Car Journal
General Machinery Corp. (Niles Tool Wks. Div.), 545 No. Third St., Hamilton, Ohio
Norton Mfg. Co., Muskegon Heights, Mich.

BORING MACHINES, Car Wheel
Consolidated Machine Tool Corp., Rochester, N. Y.
Four-Grip Tool Co., 115 E. 17th St., Paterson, N. J.
General Machinery Corp. (Niles Tool Wks. Div.), 545 No. Third St., Hamilton, Ohio
Sellers & Co., Inc., William, 1600 Hamilton St., Philadelphia, Pa.

BORING MACHINES, Cylinder
Baker Bros., Inc., Post St., Toledo, Ohio
Baush Machine Tool Co., 156 Wason Ave., Springfield, Mass.
Bullard Co., Canfield Ave., Bridgeport, Conn.
Consolidated Machine Tool Corp., Rochester, N. Y.
Ex-Cell-O Aircraft and Tool Corp., 1200 Oakman Blvd., Detroit, Mich.
Fitchburg Engrg. Corp., 52 Oak Hill Road, Fitchburg, Mass.
Foote-Burt Co., The, 13000 St. Clair Ave., Cleveland, Ohio
General Machinery Corp. (Niles Tool Wks. Div.), 545 No. Third St., Hamilton, Ohio
Heald Machine Co., New Bond St., Worcester, Mass.
Ingersoll Milling Machine Co., Rockford, Ill.
Moline Tool Co., 102 Twentieth St., Moline, Ill.
National Automatic Tool Co., South 7th and N. Sts., Richmond, Ind.
Rockford Drilling Machine Co., Rockford, Ill.
Sellers & Co., Inc., William, 1600 Hamilton St., Philadelphia, Pa.
Universal Boring Machine Co., 312 Main St., Hudson, Mass.
Van Norman Machine Tool Co., 160 Wilbraham, Springfield, Mass.

BORING MACHINES, Diamond and Carbide Tool
Automatic Machine Co., Bridgeport, Conn.
Cimatool Co., Dayton, Ohio

BORING MACHINES, (Contd.)

Cross Gear & Machine Co., 3250 Bellevue, Detroit, Mich.
Defiance Machine Works, Defiance, Ohio
Ex-Cell-O Aircraft & Tool Corp., 1200 Oakman Blvd., Detroit, Mich.
Goss & deLeeuw Machine Co., New Britain, Conn.
Heald Machine Co., New Bond St., Worcester, Mass.
Ingersoll Milling Machine Co., Rockford, Ill.
Leland-Gifford Co., Worcester, Mass.
Lucas Machine Tool Co., 523 E. 99th St., Cleveland, Ohio
Moline Tool Co., 102 Twentieth St., Moline, Ill.
National Automatic Tool Co., South 7th and N. Sts., Richmond, Ind.
Rockford Drilling Machine Co., Rockford, Ill.
Springfield Machine Tool Co., The, 631 W. Southern Ave., Springfield, Ohio
Stokerunit Corp., 4548 W. Mitchell St., Milwaukee, Wisconsin

BORING MACHINES, Jig

Baker Bros. Inc., Post St., Toledo, Ohio
Cochrane-Bly Co., 15 St. James Pl., Rochester, N. Y.
Craley Mfg. Co., C. C., P. O. Box 192, Shillington, Pa.
Fosdick Machine Tool Co., Blue Rock & Apple Sts., Cincinnati, Ohio
Gray Co., The G. A., 3611 Woodburn Ave., Cincinnati, Ohio
Index Machinery Corp., 49 Central Ave., Cincinnati, Ohio
Knight Machinery Co., W. B., 3920 West Pine Blvd., St. Louis, Mo.
Lucas Machine Tool Co., 523 E. 99th St., Cleveland, Ohio
Marburg Brothers Inc., 90 West St., New York, N. Y.
Pratt & Whitney Co., 436 Capitol Ave., Hartford, Conn.
Triplex Machine Tool Corp., 125 Barclay St., N. Y. C.
Universal Boring Machine Co., 312 Main St., Hudson, Mass.

BORING MACHINES, Locomotive Drive Box

Bullard Co., Canfield Ave., Bridgeport, Conn.
General Machinery Corp. (Niles Tool Wks. Div.), 545 No. Third St., Hamilton, Ohio
King Machine Tool Co., Cincinnati, Ohio
Schulyer, W. A., 250 W. 5th St., New York
Sellers & Co., Inc., William, 1600 Hamilton St., Philadelphia, Pa.

BORING MACHINES, Precision (see also Boring Machines, Diamond and Carbide Tool)

Atlas Press Co., 1819 N. Pitcher St. Kalamazoo, Mich.
Bryant Machinery & Engrg. Co., 400 W. Madison St., Chicago, Ill.
Cimatool Co., Dayton, Ohio
Cachrane-Bly Co., 15 St. James St., Rochester
Ex-Cell-O Aircraft & Tool Corp., 1200 Oakman Blvd., Detroit, Mich.
Heald Machine Co., New Bond St., Worcester, Mass.
Leland-Gifford Co., Worcester, Mass.
Lucas Machine Tool Co., 523 E. 99th St., Cleveland, Ohio
Moline Tool Co., 102 Twentieth St., Moline, Ill.
Rockford Drilling Machine Co., Rockford, Ill.
Stokerunit Corp., 4548 W. Mitchell St., Milwaukee, Wis.
Universal Boring Machine Co., 312 Main St., Hudson, Mass.

BORING TOOLS

Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Cincinnati Lathe & Tool Co., Oakley, Cincinnati, Ohio
Davis Boring Tool Co., (Div. Larkin Packer Co.), 6200 Maple Ave., St. Louis, Mo.
Eclipse Counterbore Co., Detroit, Mich.
Ex-Cell-O Aircraft & Tool Corp., 1200 Oakman Blvd., Detroit, Mich.
Foster Machine Co., 1100 Beasley Ave., Elkhart, Ind.
Four-Grip Tool Co., 115 E. 17th St., Paterson, N. J.
Gairing Tool Co., 629 Lafayette Blvd., Detroit, Mich.
Haynes Stellite Co., Kokomo, Ind.
Heald Machine Co., New Bond St., Worcester, Mass.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
Ingersoll Milling Machine Co., Rockford, Ill.
F. A. Kershaw, Kent, Ohio
Kelly Reamer Co., 3775 Ridge Road, Cleveland, Ohio
Lucas Machine Tool Co., 523 East 99th St., Cleveland, Ohio
McCrosky Tool Corp., 1340-80 So. Main St., Meadville, Pa.
Pipe Machinery Co., The, 930 E. 70th St., Cleveland, Ohio
Pratt & Whitney Co., 436 Capitol Ave., Hartford, Conn.
Ready Tool Co., Iranistan and Railroad Aves., Bridgeport, Conn.
Stoody Co., Whittier, Calif.
Super Tool Co., 605 Boyer Bldg., Detroit, Mich.
Taft-Peirce Mfg. Co., The, 32 Mechanic Ave., Woonsocket, R. I.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio
Wesson Co., Detroit, Mich.
Westcott Chuck Co., 118 E. Walnut St., Oneida, N. Y.
Western Tool & Mfg. Co., Springfield, Ohio
Wheel Trueing Tool Co., Detroit, Mich.

BORING TOOLS, Cemented Carbide (see Tools, Cemented Carbide)

BORING TOOLS, Diamond (see Tools, Diamond)

BOXES, Annealing and Case Hardening

Calorizing Co., Wilkensburg, Pa.
Driver-Harris Co., Harrison, N. J.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Strong, Carlisle & Hammond Co., Cleveland

BOXES, Fibre

Continental Diamond Fibre Co., Newark, Del.

BOXES, Tool

Geometric Tool Co., Blake and Valley Sts., New Haven, Conn.

BOXES, Tote

General Fireproofing Co., Youngstown, Ohio
Lyon Metal Products Co., Aurora, Ill.
Powell Pressed Steel Co., Hubbard, Ohio

BRAKE LINING

Colts Patent Fire Arms Mfg. Co., 17 Van Dyke Ave., Hartford, Conn.
Gates Rubber Co., Denver, Colo.
Savage Co., W. J., Clinch Ave. and Tenth St., Knoxville, Tenn.
Wagner Electric Corp., 6444 Plymouth Ave., St. Louis, Mo.

BRAKE LINING, Phenol Resinoid Impregnation

Bakelite Corp., Bound Brook, N. J.
General Plastics, Inc., North Tonawanda, N. Y.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., Passaic, N. J.
Marshall Asbestos Co., Troy, N. Y.

BRAKES, Electric

Electric Controller & Mfg. Co., 2700 E. 79th St., Cleveland, Ohio
General Electric Co., Schenectady, N. Y.
Goss & deLeeuw Machine Co., New Britain, Conn.
Westinghouse Elec. & Mfg. Co., East Pittsburg, Pa.

BRAKES, Magnetic

Cutler Hammer, Inc., Milwaukee, Wisconsin
Electric Controller & Mfg. Co., 2700 E. 79th St., Cleveland, Ohio
Stearns Magnetic Mfg. Co., Milwaukee, Wis.

BRAKES, Metal Forming

Cincinnati Shaper Co., Cincinnati, Ohio
Cleveland Punch & Shear Works Co., East 40th St. Clair Ave., Cleveland, Ohio
Dreis & Krump Mfg. Co., 7406 Loomis Blvd., Chicago, Ill.
Jos. T. Ryerson & Son, Inc., 2558 W. 16th St., Chicago, Ill.
Max Ams Machine Co., Bridgeport, Conn.
Peck, Stow & Wilcox Co., Southington, Conn.
Schatz Mfg. Co., Poughkeepsie, N. Y.
Service Machine Co., 752 Broadway, Elizabeth, N. J.
Strippit Corp., 1559 Niagara St., Buffalo, N. Y.
Whitney Metal Tool Co., Rockford, Ill.

BRASS, Rod, etc.

American Brass Co., Waterbury, Conn.
Revere Copper & Brass Corp., 230 Park Ave., New York, N. Y.
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.

BRAZING EQUIPMENT

E. C. Atkins & Co., 402 S. Illinois St., Indianapolis, Ind.
Disston & Sons, Inc., Henry, Tacony, Philadelphia, Pa.
Grob Bros., Grafton, Wis.
Linde Air Products Co., 30 E. 42nd St., N. Y. C.
Firth-Stirling Steel Co., McKeesport, Pa.
Oliver Machinery Co., Grand Rapids, Mich.

BRICK, for Furnaces

Carborundum Co., Niagara Falls, N. Y.
Norton Co., 1 New Bond St., Worcester, Mass.
Strong, Carlisle & Hammond Co., 1392 West Third St., Cleveland, Ohio

BROACH-SHARPENING MACHINES

Colonial Broach Co., Detroit, Mich.
Detroit Tap & Tool Co., Detroit, Mich.
Papointe Machine Tool Co., 34 Tower St., Hudson, Mass.
Thompson Grinder Co., The, 1534 West Main St., Springfield, Ohio

BROACHES

American Broach & Mach. Co., (Div. of Sundstrand Mach. Tool Co., 1 Ann Arbor, Michigan
Bullard Co., Canfield Ave., Bridgeport, Conn.
Colonial Broach Co., Detroit, Mich.
Connecticut Broach & Machine Co., New London, Conn.
Detroit Tap & Tool Co., Detroit, Mich
Ex-Cell-O Aircraft & Tool Corp., 1200 Oakman Blvd., Detroit, Mich.
Gammons Holman Co., 405 Main St., Manchester, Conn.
Haynes Stellite Co., Kokomo, Ind.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
Lapointe Machine Tool Co., 34 Tower St., Hudson, Mass.
National Broach & Mach. Co., 11455 Shoemaker Ave., Detroit, Mich.

BROACHES, Cemented Carbide (see Tools, Cemented, Carbide)

BROACHING MACHINES

American Broach & Mach. Co., (Div. of Sundstrand Mach. Tool Co., Ann Arbor, Mich.
Cincinnati Milling Machine Co., Cincinnati, Ohio
Colonial Broach Co., Detroit, Mich.
Detroit Tap & Tool Co., Detroit, Mich.
Elmes Engineering Wks., Chas. F., 1001 Fulton St., Chicago, Ill.
Flexo Machines, 816 W. Erie St., Chicago, Ill.
General Machinery Corp. (Niles Tool Wks., Div.), 545 No. Third St., Hamilton, Ohio
General Mfg. Co., 6430 Farnsworth Ave., Detroit, Mich.
Hanchett Mfg. Co., 906 N. State St., Big Rapids, Mich.
Hydraulic Press Mfg. Co., Mount Gilead, Ohio
Lapointe Machine Tool Co., 34 Tower St., Hudson, Mass.
Oilgear Co., The, 1403 W. Bruce St., Milwaukee, Wis.

BRONZE

American Brass Co., Waterbury, Conn.
Ampco Metal Co., 3830 W. Burnham St., Milwaukee, Wis.
Bunting Brass & Bronze Co., 715 Spencer St., Toledo, Ohio
Johnson Bronze Co., 100 S. Mill St., New Castle, Pa.
Revere Copper & Brass Corp., 230 Park Ave., New York, N. Y.
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.

BRUSHES, Commutator

Westinghouse Electric & Mfg. Co., East Pittsburg, Pa.

BUFFING MACHINES

Bridgeport Safety Emery Wheel Co., Inc., Bridgeport, Conn.
Champion Blower & Forge Co., Harrisburg Ave., Lancaster, Pa.
Chicago Pneumatic Tool Co., 6 East 44th St., New York, N. Y.
Cleveland Elec. Motor Co., 5213 Chester Ave., Cleveland, Ohio
Dumore Co., The, 135 14th St., Racine, Wis.
Hisey-Wolf Machine Co., Cincinnati, Ohio
Mall Tool Company, 7740 S. Chicago Ave., Chicago, Ill.
Marathon Elec. Mfg. Corp., Wassau, Wis.
Rotor Air Tool Co., 5704 Carnegie Ave., Cleveland, Ohio
Packer Machine Co., Meriden, Conn.
Standard Electrical Tool Co., 1940 W. 8th St., Cincinnati, Ohio
Strand Co., N. A., 5001 N. Lincoln St., Chicago, Ill.

BULLDOZERS

Ajax Mfg. Co., Euclid Branch P. O., Cleveland, Ohio
Baldwin-Southwark Corp., Paschall P. O. Station, Philadelphia, Pa.
Beatty Machine & Mfg. Co., Hammond, Ind.
Chambersburg Engineering Co., Chambersburg, Pa.
Columbia Machine Tool Co., 1790 Fairgrove Ave., Hamilton, Ohio
Elmes Eng. Works, Chas. F., Chicago, Ill.
Hydraulic Press Mfg. Co., Mount Gilead, Ohio
C. O. Keckley 567 Washington Blvd., Chicago, Ill.
Rock River Machine Co., Janesville, Wis.
Williams, White & Co., Moline, Ill.

BURNERS, Gas and Oil

American Gas Furnace Co., Elizabeth, N. J.
Hones, Charles A., Inc., 121 S. Rand Ave., Baldwin, N. Y.
North American Mfg. Co. 2910 E. 75th St. Cleveland, Ohio
Rockwell Co., W. S., 50 Church St., New York City
Starrett Co., The L. S., Crescent St., Athol, Mass.
Strong Carlisle & Hammond Co., 1392 W. Third St., Cleveland, Ohio

BURNISHING COMPOUNDS

Oakite Products Co., 22 Thomas St., New York, N. Y.

BURNISHING MACHINES
Cimatool Co., Dayton, Ohio
Consolidated Machine Tool Corp., Rochester, N. Y.
Fellows Gear Shaper Co., 78 River St., Springfield, Vt.
General Machinery Corp. (Niles Tool Wks. Div.), 545 N. Third St., Hamilton, Ohio

BURRING MACHINES
Ajax Mfg. Co., Euclid Branch P. O., Cleveland, Ohio
National Broach & Machine Co., 11455 Shoemaker Ave., Detroit, Mich.
National Machinery Co., Tiffin, Ohio
Niagara Mach. & Tool Co., Buffalo, N. Y.
Peck, Stow & Wilcox Co., Southington, Conn.

BUSHINGS, Brass, Bronze, etc.
A. Allan & Son, 601-609 Bergen St., Harrison, N. J.
Ampco Metal Co., 3830 W. Burnham St., Milwaukee, Wis.
Boston Gear Works, Inc., No. Quincy, Ill.
Bunting Brass & Bronze Co., 715 Spencer St., Toledo, Ohio
Haynes Stellite Co., Kokomo, Indiana
Carlyle Johnson Machine Co., 52 Main St., Manchester, Conn.
Johnson Bronze Co., 100 S. Mill St., New Castle, Pa.
Moccasin Bushing Co., Chattanooga, Tenn.

BUSHING, Drill and Jig
Colonial Broach Co., Detroit, Mich.
Detroit Tap & Tool Co., Detroit, Mich.
Ex-Cell-O Aircraft & Tool Corp., 1200 Oakman Blvd., Detroit, Mich.
Jig Bushing Co., Pontiac, Mich.
Leland-Gifford Co., 1025 Southbridge St., Worcester, Mass.
Universal Engineering Co., Frankenmuth, Mich.

BUSHINGS, Graphited
Bunting Brass & Bronze Co., 715 Spencer St., Toledo, Ohio
Johnson Bronze Co., 100 S. Mill St., New Castle, Pa.

BUTTONS, Locating
Brown & Sharpe Mfg. Co., Providence, R. I.
Starrett Co., The L. S. Crescent St., Athol, Mass.
Universal Engineering Co., Frankenmuth, Mich.

CALCULATOR, Speed
Foster Machine Co., 1100 Beasley Ave., Elkhart, Indiana

CALIPERS
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Brown & Sharpe Mfg. Co., Providence, R. I.
Lufkin Rule Co., The, Saginaw, Michigan
Randall & Stickney, Waltham, Mass.
Scherr Co., Inc., Geo., 128 Lafayette St., New York, N. Y.
Starrett Co., The L. S., Crescent St., Athol, Mass.

CALIPERS, Roll
Farrel-Birmingham Co., Inc., Ansonia, Conn.

CAM SHAFTS, Hollow Bored
American Hollow Boring Co., 19th and Raspberry Sts., Erie, Pa.

CAMS
Brown & Sharpe Mfg. Co., Providence, R. I.
City Machine and Tool Works, E. 3rd at June, Dayton, Ohio
Cross Gear & Machine Co., 3250 Bellevue, Detroit, Michigan
Hartford Special Machinery Co., 282 Homestead Ave., Hartford, Conn.
Heppenstall Co., 4620 Hatfield St., Pittsburgh, Pa.
Kux-Lohner Machine Co., 2145 Lexington St., Chicago, Ill.
Modern Collett & Mach. Co., Ecorse, Mich.
Rowbottom Machine Co., Waterury, Conn.

CAMS, Hydraulic and Air Operated
Cimatool Co., E. 3rd and June, Dayton, Ohio

CAMS, Face Type
Kux-Lohner Machine Co., 2145 Lexington St., Chicago, Ill.
Massachusetts Gear & Tool Co., 25 Nashua St., Woburn, Mass.

CARBIDE ALLOYS
Anchor Drawn Steel Co., Pittsburgh, Pa.
Carboloy Co., Inc., 2987 E. Jefferson Ave., Mich.
Colonial Broach Co., Detroit, Mich.
Colonial Steel Co., Pittsburg, Pa.
Detroit Tap & Tool Co., Detroit, Mich.
Firth-Stirling Steel Co., McKeesport, Pa.
Gairing Tool Co., 629 Lafayette Blvd., Detroit, Mich.
Haynes Stellite Co., Kokomo, Indiana
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
Super Tool Company, 356 E. Congress St., Detroit, Mich.
Vascoloy Ramet Division of Vanadium Alloys Steel Co., No. Chicago, Ill.
Wesson Co., Detroit, Mich.

CARBIDE, Calcium
Air Reduction Sales Company, 60 East 42nd St., New York, N. Y.
Linde Air Products Co., 30 E. 42nd St., N. Y.

CARBURIZERS
E. F. Houghton Co., 240 W. Somerset St., Philadelphia, Pa.

CARBURIZING BOXES
Driver-Harris Co., Harrison, N. J.
Strong, Carlisle & Hammond Co., 1392 West Third St., Cleveland, Ohio

CARBURIZING MACHINE
American Gas Furnace Co., Elizabeth, N. J.
Holden Co., A. F., 200 Winchester Ave., New Haven, Conn.
Houghton & Co., E. F., Philadelphia, Pa.
Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia, Pa.
Rockwell Co., W. S., 50 Church St., New York City

CAR MOVERS
Atkins & Co., E. C., 424 So. Illinois St., Indianapolis, Ind.

CASE HARDENING (see Heat-Treating)

CASES, Drill
Huot Mfg. Co., 128 East 10th St., St. Paul, Minn.
Morse Twist Drill & Machine Co., 163 Pleasant St., New Bedford, Mass.

CASES, Tool
Gerstner & Sons, H. Dayton, Ohio
Lufkin Rule Co., Saginaw, Mich.

CAST RESINOIDS, Transparent and Opaque Translucent
Bakelite Corp., Bound Brook, N. J.

CASTERS, Ball Bearing
Boston Gear Works, Inc., North Quincy, Mass.

CASTINGS, Alloy
Aluminum Co. of America, Pittsburgh, Pa.
Beryllium Corp. of Pa., Reading, Pa.
Chambersburg Engineering Co., Chambersburg, Pa.
Colmonoy, Inc., P. O. Box 977, Los Nietos, Calif.
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.
Driver-Harris Co., Harrison, N. J.
Erie Foundry Co., Erie, Penna.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Haynes Stellite Co., Kokomo, Indiana
Hoskins Mfg. Co., 4445 Lawton Ave., Detroit, Mich.
Ideal Foundry & Machinery Co., Beaver Falls, Penna.
Lake Erie Engineering Corp., Kenmore Station, Buffalo, N. Y.
Link-Belt Co., 307 N. Michigan Ave., Chicago
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Taylor & Fenn Co., 94 Arch St., Hartford, Conn.

CASTINGS, Aluminum
Aluminum Co. of America, Pittsburgh, Pa.
Clarksville Foundry & Machine Works, Commerce & Spring Sts., Clarksville, Tennessee.
Ideal Foundry & Machinery Co., Beaver Falls, Pa.
Savage Co., W. J., Clinch Ave. and Tenth St., Knoxville, Tenn.
Stewart Die Casting Corp., Chicago, Ill.
Union Drawn Steel Co., Massillon, Ohio

CASTINGS, Brass, Bronze and Copper
Ampco Metal Co., 3830 W. Burnham St., Milwaukee, Wis.
Beryllium Corp. of Pa., Reading, Pa.
Bullard Company, Canfield Ave., Bridgeport, Conn.
Bunting Brass & Bronze Co, 715 Spencer St., Toledo, Ohio
Clarksville Fdry. & Mach. Wks, Commerce & Springs Sts., Clarksville, Tenn.
Ideal Foundry & Machinery Co., Beaver Falls, Pa.
Johnson Bronze Co., Newcastle, Pa.
Moccasin Bushing Co., Chattanooga, Tenn.
Savage Co., W. J. Clinch Ave. and Tenth St., Knoxville, Tenn.
Stewart Die Casting Corp., Chicago, Ill.
Union Drawn Steel Co., Massillon, Ohio

CASTINGS, Centrifugal
Ampco Metal Co., 3830 W. Burnham St., Milwaukee, Wis.
Michigan Steel Casting Co., 1986 Gudin St., Detroit, Mich.

CASTINGS, Die
Aluminum Co. of America, Pittsburgh, Penna.
American Brass Co., Waterbury, Conn.
Veeder-Root Incorporated, Hartford, Conn.

CASTINGS, Gray Iron
American Engineering Co., 2407 Aramingo Ave., Philadelphia, Pa.
Brown & Sharpe Mfg. Co., Providence, R. I.
Bullard Company, Canfield Ave., Bridgeport, Conn.
Chambersburg Engineering Co., Chambersburg, Penna.
Clarksville Fdry. & Mach. Wks., Commerce & Springs Sts., Clarksville, Tenn.
Covel Mfg. Co., Benton Harbor, Mich.
Erie Foundry Co., Erie, Pa.
Etna Machine Co., Toledo, Ohio
Farrel-Birmingham Co., Inc., Ansonia, Conn.
General Machinery Corp. (Niles Tool Wks. Div.) 545 North Third St., Hamilton, Ohio
Gerdes and Co., Inc., 36 Church St., New York City
Gisholt Machine Co., 1201 E. Washington Ave., Madison, Wis.
Hanson Clutch & Machinery Co., Tiffin, Ohio
Hendey Machine Co., 105 Windsor St., Hartford, Conn.
Ideal Foundry & Machinery Co., Beaver Falls, Pa.
Lake Erie Engrg. Corp., Kenmore Station, Buffalo, N. Y.
Link-Belt Co., 220 S. Belmont Ave., Ind.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Savage Co., W. J., Clinch Ave. and Tenth St., Knoxville, Tenn.
Taylor & Fenn Co., The, 54 Arch St., Hartford, Conn.
Union Mfg. Co., New Britain, Conn.

CASTINGS, Mechanite
Farrel-Birmingham Co., Inc., Ansonia, Conn.

CASTINGS, Permanent Mold
Aluminum Co. of America, Pittsburgh, Pa.

CASTINGS, Steel
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh, Pa.
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.
Disston & Sons, Inc., Henry, Tacony, Philadelphia, Pa.
Etna Machine Co., Toledo, Ohio
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Link-Belt Co., 300 W. Pershing Rd., Chicago Ill.
Michigan Steel Casting Co., 1986 Gudin St., Detroit, Mich.

CEMENT, Disk Wheel
Gardner Machine Co., Beloit, Wis.
Hanchett Mfg. Co., 906 North State St., Big Rapids, Mich.
Maas & Waldstein, Newark, N. J.
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
Prosser & Sons, Thos., 15 Gold St., New York, N. Y.

CEMENT, Phenol Resinoid
Bakelite Corp. Bound Brook, N. J.

CEMENT, Refractory
Carborundum Co., Niagara Falls, N. Y.
Norton Company, 1 New Bond St., Worcester, Mass.

CENTER REAMERS
Butterfield Div. (Union Twist Drill Co.), Derby Line, Vt.
S. W. Card Mfg. Co. (Div. Union Twist Drill), Mansfield, Mass.
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio
Greenfield Tap & Die Corp., Sanderson St., Greenfield, Mass.
Morse Twist Drill & Machine Co., 163 Pleasant St., New Bedford, Mass.
National Twist Drill & Tool Co., 6522 Brush St., Detroit, Mich.
Pratt & Whitney Co., 436 Capitol Ave., Hartford, Conn.
Standard Tool Co., 6918 Central Ave., S. E., Cleveland, Ohio
Union Twist Drill Co., Athol, Mass.

CENTERING MACHINES
General Machinery Corp. (Niles Tool Wks. Div.), 545 North Third St., Hamilton, Ohio
Hanson-Whitney Machine Co., 169 Bartholomew Ave., Hartford, Conn.
Hendey Machine Co., 105 Summer St., Torrington, Conn.
Pratt & Whitney Co., 436 Capitol Ave., Hartford, Conn.
Seneca Falls Machine Co., Seneca Falls, N. Y.
Sundstrand Machine Tool Co., Rockford, Ill.

CENTERS, Ball Bearing
Ready Tool Co., Iranistan and Railroad Aves., Bridgeport, Conn.

CENTERS, Grinder
Carboloy Co., Inc., 2987 E. Jefferson Ave., Detroit, Mich.
Gorham Tool Co., 14400 Woodrow Wilson Ave., Detroit, Mich.
Ready Tool Co., Iranistan and Railroad Aves., Bridgeport, Conn.

WHERE-TO-BUY DIRECTORY

CENTERS, Indexing
Abrasive Machine Tool Co., East Providence, R. I.
Brown & Sharpe Mfg. Co., Providence, R. I.
Gould & Eberhardt, 480 Chancellor Ave., Irvington, N. J.
Hendey Machine Co., 105 Summer St., Torrington, Conn.
Knight Machinery Co., W. B., 3920 West Pine Blvd., St. Louis, Mo.

CENTERS, Lathe
Bullard Company, Canfield Ave., Bridgeport, Conn.
Carboloy Co. Inc., 2989 E. Jefferson Ave., Detroit, Mich.
Cincinnati Lathe & Tool Co., Oakley, Cincinnati, Ohio
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio
Eclipse Counterbore Co., Detroit, Mich.
Gorham Tool Co., 14400 Woodrow Wilson Ave., Detroit, Mich.
Haynes Stellite Co., Kokomo, Indiana
Hendey Machine Co., 105 Summer St., Torrington, Conn.
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Ready Tool Co., The, 550 Iranistan Ave., Bridgeport, Conn.
Standard Tool Co., The, 6918 Central Ave., Cleveland, Ohio
Super Tool Co., 356 E. Congress St., Detroit, Mich.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio
Wesson Co., Detroit, Mich.

CENTERS, Lathe and Grinder, Cemented Carbide
Carboloy Co., 2989 E. Jefferson Ave., Detroit

CENTERS, Planer and Miller
Brown & Sharpe Mfg. Co., Providence, R. I.
Hendey Machine Co., 105 Summer St., Torrington, Conn.
Wesson Co., Detroit, Mich.

CHAIN BLOCKS (see Hoists)

CHAIN DRIVES
Bilgram Gear & Machine Works, 1235 Spring Garden St., Philadelphia, Pa.
Boston Gear Works, North Quincy, Mass.
Cullman Wheel Co., Chicago, Ill.
Diamond Chain & Mfg. Co., 402 Kentucky Ave., Indianapolis, Ind.
Grant Gear Works, Inc., 154 W. Second St., South Boston, Mass.
Link-Belt Co., 519 No. Holmes Ave., Indianapolis, Ind.
Meisel Press Mfg. Co., Boston, Mass.
Morse Chain Co., Ithaca, N. Y.
Palmer-Bee Co., Westminster & G. T. R. R. Detroit, Mich.
Philadelphia Gear Works, Philadelphia, Pa.
Savage Co., W. J., Clinch Ave., and Tenth St., Knoxville, Tenn.
Whitney Chain & Mfg. Co., Hartford, Conn.

CHAINS, Conveyor
Boston Gear Works Inc., North Quincy Mass.
Cullman Wheel Co., Chicago, Ill.
Diamond Chain & Mfg. Co., 402 Kentucky Ave., Indianapolis, Ind.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.
Palmer-Bee Co., Westminster & G. T. R. R. Detroit, Mich.
Savage Co., W. J., Clinch Ave. and Tenth St. Knoxville, Tenn.
Whitney Chain & Mfg. Co., Hartford, Conn.

CHAIN ROLLER
Cullman Wheel Co., 1349 Altgeld St., Chicago, Ill.
Diamond Chain & Mfg. Co., 402 Kentucky Ave., Indianapolis, Ind.
Link-Belt Co., 519 N. Holmes Ave., Indianapolis, Ind.
Palmer-Bee Co., Westminster & G. T. R. R. Detroit, Mich.

CHAINS, Transmission
Boston Gear Works, Inc., North Quincy, Mass.
Cincinnati Gear Co., 1825 Reading Road, Cincinnati, Ohio
Cullman Wheel Co., Chicago, Ill.
Diamond Chain & Mfg. Co., 402 Kentucky Ave., Indianapolis, Ind.
Link-Belt Co., 519 N. Holmes Ave., Indianapolis, Ind.
Morse Chain Co., Ithaca, N. Y.
Philadelphia Gear Works, Philadelphia, Pa.
Savage Co., W. J., Clinch Ave. and Tenth St. Knoxville, Tenn.
Whitney Chain & Mfg. Co., Hartford, Conn.

CHAIRS AND STOOLS (see Furniture, Machine Shop)

CHAMFERING MACHINES
Bilgram Gear & Machine Works, 1235 Spring Garden St., Philadelphia, Pa.
Cimatool Co., Dayton, Ohio
Consolidated Machine Tool Corp., Rochester, N. Y.
Cross Gear & Machine Co., 3250 Bellevue Detroit, Mich.
Grant Mfg. & Machine Co., 90 Sillman Ave., Bridgeport, Conn.
Lipe, Inc., W. C., 208 S. Geddes St., Syracuse N. Y.
Murchey Machine & Tool Co., 961 Porter St., Detroit, Mich.
National Broach & Machine Co., 11455 Shoemaker Ave., Detroit, Mich.

CHANNELS (see Angles, Beams, Channels and Tees)

CHASERS, (see Die Heads)

CHECKS, Metal, Time, and Tool
Noble & Westbrook Mfg. Co., 20 Westbrook St., East Hartford, Conn.
Revere Copper & Brass Corp., 230 Park Ave., New York, N. Y.

CHESTS, Tool
Berger Mfg. Co. (Sub. of Republic Steel Corp.), Canton, Ohio
Gerstner & Sons, H. Dayton, Ohio
Lufkin Rule Co., The, Saginaw, Mich.
Stanley Works, New Britain, Conn.

CHISEL BLANKS
Cleveland Punch & Shear Works Co., E. 40th and St. Clair Ave., Cleveland, Ohio

CHROMIUM PLATING
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
United Chromium Inc., 51 E. 42nd St., New York, N. Y.
Veeder-Root Inc., Hartford, Conn.
Vinco Tool Co., 7350 Central Ave., Detroit, Mich.

CHUCK CYLINDERS, Air
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hannifin Mfg. Co., 621 South Kolmar Ave., Chicago, Ill.
Logansport Machine Inc., Logansport, Ind.
Potter & Johnston Machine Co., Pawtucket, R. I
Skinner Chuck Co., 344 Church St., New Britain, Conn.
Tomkins-Johnson Co., The, 615 N. Mechanic St., Jackson, Mich.

CHUCKING MACHINES
Baird Machine Co., Bridgeport, Conn.
Cincinnati Lathe & Tool Co., Oakley, Cincinnati, Ohio
Cleveland Automatic Machine Co., Cleveland, Ohio
Foster Machine Co., 1100 Beasley Ave., Elkhart, Ind.
Gisholt Machine Co., 1201 E. Washington Ave., Madison, Wis.
George Gorton Machine Co., 1107 13th St., Racine, Wis.
Goss & deLeew Mach. Co., New Britain, Conn.
National Acme Co., Cleveland, Ohio
New Britain-Gridley Mach. Div. New Britain Mach. Co., 140 Chestnut St., New Britain, Conn.
Potter & Johnston Machine Co., Pawtucket, R. I.
Sundstrand Machine Tool Co., Rockford, Ill.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio

CHUCKS, Automatic and Quick Changing
Consolidated Machine Tool Corp., Rochester, N. Y.
Errington Mechanical Laboratory, 24 Norwood Ave., Stapleton, Staten Island, N. Y.
McCrosky Tool Corp., 1340-80 S. Main St., Meadville, Pa.
Morse Twist Drill & Machine Co., 163 Pleasant St., New Bedford, Mass.
Potter & Johnston Machine Co., Pawtucket, R. I.
Tomkins-Johnson Co., The, 615 N. Mechanic St., Jackson, Mich.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio

CHUCKS, Collet (see Collets)

CHUCKS, Diaphragm
Van Norman Machine Tool Co., 160 Wilbraham Ave., Springfield, Mass.

CHUCKS, Drill and Tap
Apex Mach. & Tool Co., Dayton, Ohio
Errington Mechanical Laboratory, 24 Norwood Ave., Stapleton, Staten Island, N. Y.
Ettco Tool Co., 594 Johnson Ave., Brooklyn, N. Y.
Jacobs Mfg. Co., 2074 Park St., Hartford, Conn.
McCrosky Tool Corp., 1340-80 S. Main St., Meadville, Pa.
Skinner Chuck Co., 344 Church St., New Britain, Conn.
Standard Tool Co., The, 6918 Central Ave., Cleveland, Ohio
Union Mfg. Co., New Britain, Conn.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio
Westcott Chuck Co., 118 E. Walnut St., Oneida, N. Y.

CHUCKS, Electric
Cushman Chuck Co., Hartford, Conn.
Goss & deLeeuw Machine Co., New Pawtucket, R. I.
Potter & Johnston Machine Co., Pawtucket, R. I.
Union Mfg. Co.,New Britain, Conn.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio

CHUCKS, Full Floating
Apex Machine & Tool Co., Dayton, Ohio
Errington Mechanical Laboratory, 24 Norwood Ave., Stapleton, Staten Island, N. Y.
Modern Collet & Machine Co., 401 Salliottee St., Ecorse, Detroit, Mich.
Universal Engineering Co., Frankenmuth, Mich.

CHUCKS, Hydraulic
Cross Gear & Machine Co., 3250 Bellevue, Detroit, Mich.
Gisholt Machine Co., 1201 E. Washington Ave., Madison Wis.
Hannifin Mfg. Co., 621 S. Kolmar Ave., Chicago, Ill.
Logansport Machine Co., Logansport, Ind.
Potter & Johnston Machine Co., Pawtucket, R. I.
Skinner Chuck Co., 344 Church St., New Britain, Conn.
Tomkins-Johnson Co., The, 615 N. Mechanic St., Jackson, Mich.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio

CHUCKS, Lathe
Atlas Press Co., 1819 N. Pitcher St., Kalamazoo, Mich.
Boice Crane Co., Toledo, Ohio
Cincinnati Lathe & Tool Co., Oakley, Cincinnati, Ohio
Cushman Chuck Co., Hartford, Conn.
Delta Mfg Co., Vienna Ave., Milwaukee, Wis.
Foster Machine Co., 1100 Beasley Ave., Elkhart, Ind.
Gisholt Machine Co., 1201 E. Washington Ave., Madison, Wis.
Harnischfeger Corp., 4400 W. National Ave., Milwaukee, Wis.
Hendey Machine Co., 105 Summer St., Torrington, Conn.
Potter & Johnston Machine Co., Pawtucket, R. I.
Pratt & Whitney, Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Rivett Lathe & Grinder Co., Inc., 20 Riverview Rd., Brighton, Boston, Mass.
Sjogren Mfg. Co., Los Angeles, Calif.
Skinner Chuck Co., 344 Church St., New Britain, Conn.
Stark Tool Co., Waltham Mass.
Steege Machinery Co., 14 So. Clinton St., Chicago, Ill.
Tomkins-Johnson Co., The, 615 N. Mechanic St., Jackson, Mich.
Union Mfg. Co., New Britain, Conn.
Westcott Chuck Co., 118 E. Walnut St., Oneida, N. Y.

CHUCKS, Magnetic
Abrasive Machine Tool Co., East Providence, R. I.
Arter Grinding Machine Co., 15 Sagamore Rd., Worcester, Mass.
Heald Machine Co., New Bond St., Worcester, Mass.
Rite Electric Mfg. Co., New York City
Steege Machinery Co., 14 So. Clinton St., Chicago, Ill.
Taft-Peirce Mfg. Co., The, 32 Mechanic Ave., Woonsocket, R. I.
Walker Co., Inc., O. S. Worcester, Mass.

CHUCKS, Pneumatic
Hannifin Mfg. Co., 621 S. Kolmar Ave., Chicago, Ill.
Logansport Machine Inc., Logansport, Ind.
Potter & Johnson Machine Co., Pawtucket, R. I.
Skinner Chuck Co., 344 Church St., New Britain, Conn.
Tomkins-Johnson Co., The, 615 N. Mechanic St., Jackson, Mich.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio

CHUCKS, Ring Wheel
Abrasive Machine Tool Co., East Providence, R. I.
Bridgeport Safety Emery Wheel Co., Inc., Bridgeport, Conn.
Gardner Machine Co., Beloit, Wis.
Hanchett Mfg. Co., 906 N. State St., Big Rapids, Mich.

CHUCKS, Spring
Brown & Sharpe Mfg. Co., Providence, R. I.
Harnischfeger Corp., 4400 W. National Ave., Milwaukee, Wis.
Modern Collett & Machine Co., 401 Salliottee St., Ecorse, Detroit, Mich.
Morrison Machine Products Inc., Elmira, N. Y.

CHUCKS, Vertical Boring Mill

Bullard Co., Canfield Ave., Bridgeport, Conn.
Consolidated Machine Tool Corp., Rochester, N. Y.
Gisholt Machine Co., 1201 E. Washington Ave., Madison, Wis.
King Machine Tool Co., Cincinnati, Ohio
Union Mfg. Co., New Britain, Conn.
Universal Engineering Co., Frankenmuth, Mich.

CLAMPS, "C"

Armstrong Bros. Tool Co., 315 Francisco Ave., Chicago, Ill.
Bonney Forge & Tool Works, Allentown, Pa.
J. H. Williams & Co., 75 Spring St., N. Y.

CLAMPS, Machinists'

Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Brown & Sharpe Mfg. Co., Providence, R. I.
Lufkin Rule Co., The, Saginaw, Mich.
Starrett Co., The L. S., Crescent St., Athol, Mass.
Western Tool & Mfg. Co., Springfield, Ohio
J. H. Williams & Co., 75 Spring St., N. Y.

CLAMPS, Strap

Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
J. H. Williams & Co., 75 Spring St., N. Y.

CLEANERS, Compound

Bullard Co., Canfield Ave., Bridgeport, Conn.
Curran Corp., 114 Central St., Somerville, Mass.
Detroit Rex Products Co., 13005 Hillview Ave, Detroit, Mich.
Houghton & Co., E. F., Philadelphia, Pa.
Oakite Products Co., 22 Thames St., New York, N. Y.

CLEANERS, File

Nicholson File Co., Providence, R. I.

CLEANING MACHINES, Metal

American Foundry Equipment Co., Mishawaka, Ind.
Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.
Detroit Rex Products Co., 13005 Hillview Ave., Detroit, Mich.
Hobart Bros. Co., Troy, Ohio
Metalwash Machinery Co., Inc., 117 E. 24th St., New York City
Ransohoff, Inc., N. Carthage, Cincinnati, Ohio

CLEANING MACHINES, Metal Grinding

Chicago Pneumatic Tool Co., 6 East 44th St., New York, N. Y.
Hobart Bros. Co., Troy, Ohio

CLUTCH SHAFTS, Hollow Bored

American Hollow Boring Co., 19th and Raspberry Sts., Erie, Pa.

CLUTCHES, Friction

Ajax Mfg. Co., Euclid Branch P. O., Cleveland, Ohio
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Errington Mechanical Laboratory, 24 Norwood Ave., Stapleton, Staten Island, N. Y.
Dodge Mfg. Corp., Mishawaka, Ind.
Fairbanks, Morse and Co., 900 S. Wabash Ave., Chicago, Ill.
Hanson Clutch & Machinery Co., Tiffin, Ohio
Johnson Machine Co., Carlyle, 52 Main St., Manchester, Conn.
Link Belt Co., 2410 W. 18 St., Chicago, Ill.
W. C. Lipe, Inc., 208 S. Geddes St., Syracuse, N. Y.
Morse Chain Co., Ithaca, N. Y.
Power Transmission Council, 1 Atlantic St., Stamford, Conn.
Rockford Drilling Machine Co., Rockford, Ill.
Savage Co., W. J., Clinch Ave., and Tenth St., Knoxville, Tenn.
Twin Disc Clutch Co., 1324 Racine St., Racine, Wis.

CLUTCHES, Magnetic

Cutler Hammer, Inc., Milwaukee, Wis.
Power Transmission Council, 1 Atlantic St., Stamford, Conn.
Stearns Magnetic Mfg. Co., Milwaukee, Wis.

COLLARS, Safety

Dodge Mfg. Corp., Mishawaka, Ind.
Hanson Clutch & Machinery Co., Tiffin, Ohio
Johnson Machine Co., Carlyle, 52 Main St., Manchester, Conn.
Link-Belt Co., 2410 W. 18 St., Chicago, Ill.
Savage Co., W. J., Clinch Ave. and Tenth St., Knoxville, Tenn.
Standard Pressed Steel Co., Jenkintown, Pa.

COLLARS, Spacing

E. C. Atkins & Co., 402 S. Illinois St., Indianapolis, Ind.
Boston Gear Works, Inc., North Quincy, Mass.
Hanson Clutch & Machinery Co., Tiffin, Ohio
Morse Twist Drill & Machine Co., 163 Pleasant St., New Bedford, Mass.
Savage Co., W. J., Clinch Ave. and Tenth St., Knoxville, Tenn.
Standard Pressed Steel Co., Jenkintown, Pa.

COLLETS

Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Mach. Co., Cincinnati,
Consolidated Machine Tool Corp., Rochester,
Cushman Chuck Co., Hartford, Conn.
Gisholt Machine Co., 1201 E. Washington Ave., Madison, Wis.
Hannifin Mfg. Co., 621 S. Kolmar Ave., Chicago, Ill.
Hardinge Brothers, Inc., Elmira, N. Y.
Hendey Machine Co., 105 Summer St., Torrington, Conn.
Modern Collett & Machine Co., 401 Salliotte St., Ecorse, Detroit, Mich.
Morrison Machine Products, Inc., Elmira, N. Y.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Rivett Lathe & Grinder Co., Inc., 20 Riverview Rd., Brighton, Boston, Mass.
Stark Tool Co., Waltham, Mass.
Tomkins-Johnson Co., The, 615 N. Mechanic St., Jackson, Mich.
Universal Engineering Co., Frankenmuth, Mich.
Van Norman Machine Tool Co., Springfield, Mass.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio

COLLETS, Drill

Apex Mach. & Tool Co., Dayton, Ohio
Buhr Machine Tool Co., 839 Greene St., Ann Arbor, Mich.
Modern Collett & Machine Co., 401 Salliotte St., Ecorse, Detroit, Mich.
Morse Twist Drill & Machine Co., 163 Pleasant St., New Bedford, Mass.
National Automatic Tool Co., South 7th and N Sts., Richmond, Ind.
National Twist Drill & Tool Co., 6522 Brush St., Detroit, Mich.
Pratt & Whitney Div., Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Standard Tool Co., The, 6918 Central Ave., Cleveland, Ohio
Tomkins-Johnson Co., The, 615 N. Mechanic St., Jackson, Mich.
Union Twist Drill Co., Athol, Mass.
Universal Engineering Co., Frankenmuth, Mich.

COLLETS, Lathe and Milling Machine

Hardinge Brothers, Inc., Elmira, N. Y.
Hendey Machine Co., 105 Summer St., Torrington, Conn.
Modern Collett & Machine Co., 401 Salliotte St., Ecorse, Detroit, Mich.
Morse Twist Drill & Machine Co., 163 Pleasant St., New Bedford, Mass.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Reed-Prentice Co., 677 Cambridge St., Worcester, Mass.
Rivett Lathe & Grinder Co., Inc., 20 Riverview Rd., Brighton, Boston, Mass.
Stark Tool Co., Waltham, Mass.
Van Norman Machine Tool Co., Springfield, Mass.
Vinco Tool Co., 7350 Central Ave., Detroit
Wade Tool Co., 49 River St., Waltham, Mass.

COLLETS, Screw Machine

Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Lathe & Tool Co., Oakley, Cincinnati, Ohio
Cone Automatic Machine Co., Windsor, Vt.
Davenport Machine Tool Co., 167 Ames St., Rochester, N. Y.
Foster Machine Co., 1100 Beasley Ave., Elkhart, Ind.
Gisholt Machine Co., 1201 E. Washington Ave., Madison, Wis.
Hardinge Brothers, Inc., Elmira, N. Y.
Index Machinery Corp., 49 Central Ave., Cincinnati, Ohio
Modern Collett & Machine Co., 401 Salliotte St., Ecorse, Detroit, Mich.
Morrison Machine Products Inc., Elmira, N. Y.
New Britain-Gridley Machine Co., 140 Chestnut St., New Britain, Conn.

COMPARATORS, Dial

Marburg Brothers, Inc., 90 West St., New York, N. Y.
Mica Instrument Co., 10 Arrow St., Cambridge, Mass.
Scherr Co., Inc., Geo., 128 Lafayette St., New York, N. Y.
Sheffield Gage Corp., Dayton, Ohio
Starrett Co., The L. S., Crescent St., Athol, Mass.
Van Keuren Co., The, 12 Copeland St., Watertown, Mass.

COMPARATORS, Dial, Electric

Pratt & Whitney Div., Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Sheffield Gage Corp., Dayton, Ohio

COMPARATORS, Gear Tooth

Bausch & Lomb Optical Co., Rochester, N. Y.
Farrel-Birmingham Co., Inc., 355 Vulcan St., Buffalo, N. Y.
Scherr Co., Inc., Geo., 128 Lafayette St., New York, N. Y.
Starrett Co., The L S, Crescent St., Athol, Mass.

COMPARATORS, Screw Thread

Jones & Lamson Machine Co., Springfield, Vt.
Scherr Co., Inc., Geo., 128 Lafayette St., New York, N. Y.
Starrett Co., The L S., Crescent St., Athol, Mass.

COMPOUNDS, Broaching and Lapping

National Broach & Machine Co., 11455 Shoemaker Ave., Detroit, Mich.

COMPOUNDS, Cutting Drill and Grinding

Atkins & Co., E. C., 424 S. Illinois St., Indianapolis, Ind.
Gulf Refining Co., Gulf Bldg. Pittsburgh, Pa.
Houghton & Co., E. F., Philadelphia, Pa.
Oakite Products Co., 22 Thames St., New York, N. Y.
Racine Tool & Machine Co., 1751 State St., Racine, Wis.
Socony-Vacuum Oil Co., New York, N. Y.
Standard Oil Co. of Indiana, 910 S. Michigan Ave., Chicago, Ill.
Stuart Oil Co., D. A., 2727 S. Troy St., Chicago, Ill.
Tidewater Associated Oil Co., 17 Battery Place, N. Y.

COMPOUNDS, Drawing

Houghton & Co., E. F., 240 W. Somerset St., Philadelphia, Pa.

COMPOUNDS, Insulating

Bakelite Corp., Bound Brook, N. J.
Goodrich Co., B. F., 576 South Main St., Akron, Ohio
Socony-Vacuum Oil Co., New York, N. Y.

COMPOUNDS, Tempering and Case Hardening

Houghton & Co., E. F., Philadelphia, Pa.
Strong, Carlise & Hammond Co., 1392 West Third St., Cleveland, Ohio
Stuart Oil Co., D. A., 2727 S. Troy St., Chicago, Ill.

COMPOUNDS, Valve Grinding

Carborundum Co., Niagara Falls, N. Y.
Norton Co., Worcester, Mass.

COMPRESSORS, Air and Gas

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Binks Mfg. Co., 3114 Carrol Ave., Chicago.
Chicago Pneumatic Tool Co., 6 East 44th St., New York, N. Y.
Curtis Pneumatic Machinery Co., 1924 Kienler Ave., St. Louis, Mo.
De Laval Steam Turbine Co., Trenton, N. J.
De Vilbiss Co., Toledo, Ohio
Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Ingersoll-Rand Co., 11 Broadway, New York, N. Y.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Savage Co., W. J., Clinch Ave. and Tenth St., Knoxville, Tenn.

COMPRESSORS, Centrifugal

DeLaval Steam Turbine Co., Trenton, N. J.
General Electric Co., Schenectady, N. Y.

CONDUIT, Thinwall

Aluminum Co. of America, 2107 Gulf Bldg., Pittsburgh, Pa.
Steel & Tubes, Inc. (Sub. of Republic Steel Corp.), Cleveland, Ohio

CONTOUR PROJECTORS

Bausch & Lomb Optical Co., Rochester, N. Y.
Leitz, Inc., E., New York, N. Y.
Scherr Co., Inc., Geo., 128 Lafayette St., New York N. Y.

CONTRACT WORK

All Steel Welded Truck Corp., 1145 Railroad Ave., Rockford, Ill.
American Broach Machine Co., 415 W. Huron St., Ann Arbor, Mich.
Automatic Machine Company, Bridgeport, Conn.
Baker Bros., Inc., Post St., Toledo, Ohio
Baush Machine Tool Co., 156 Wason Ave., Springfield, Mass.
Bergram Mach. Engineering Co., New Britain, Conn.
Charles H. Besley & Co., 118-124 North Clinton St., Chicago, Ill.
Brown & Sharpe Mfg. Co., Providence, R. I.
Buhr Machine Tool Co., 839 Greene St., Ann Arbor, Mich.
Bullard Company, Canfield Ave., Bridgeport, Conn.
Cimatool Co., Dayton, Ohio
Cincinnati Lathe & Tool Co., Oakley, Cincinnati, Ohio
Cleveland Universal Jig Co., 13325 St. Clair Ave., Cleveland, Ohio
Cochrane-Bly Co., 15 St. James Place, Rochester, N. Y.
Colonial Broach Co., Detroit, Mich.
Columbia Machine Tool Co., 1798 Fairgrove Ave., Hamilton, Ohio
Consolidated Machine Tool Corp., Rochester, N. Y.
Dayton Rogers Mfg. Co., Minneapolis, Minn.
Detroit Tap & Tool Co., Detroit, Mich.

CONTRACT WORK (Cont.)
Earle Gear & Machine Co., 4723 Stenton Ave., Philadelphia, Pa.
Eastern Machine Screw Corp., Truman and Barclay Sts., New Haven, Conn.
Elmes Engrg. Works, Chas. F., 1001 Fulton St., Chicago, Ill.
Ex-Cell-O Aircraft & Tool Corp., 1200 Oakman Blvd., Detroit, Mich.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Fellows Gear Shaper Co., 78 River St., Springfield, Vt.
Ganschow Gear Co., 1013 Washington Blvd., Chicago, Ill.
General Machinery Corp. (Niles Tool Works Div.), 545 N. Third St., Hamilton, Ohio
Gisholt Machine Co., 1201 E. Washington Ave., Madison, Wis.
Globe Machine & Stamping Co., 1250 West 76th St., Cleveland, Ohio
Gould & Eberhardt, 480 Chancellor Ave., Irvington, N. J.
Greenlee Bros. & Co., Twelfth St. and Columbia Ave., Rockford, Ill.
Hartford Special Machinery Co., 282 Homestead Ave., Hartford, Conn.
Hobbs Mfg. Co., Worcester, Mass.
Ingersoll Milling Machine Co., Rockford, Ill.
Kent-Owens Machine Co., Toledo, Ohio
Knight Machinery Co., W. B., 3920 West Pine Blvd., St. Louis, Mo.
Lempco Products Inc., Dunham Road, Bedford, Ohio
W. C. Lipe, Incorporated, 208 S. Geddes St., Syracuse, N. Y.
Littell Machine Co., F. J., 4127 Ravenswood Ave., Chicago, Ill.
Meisel Press Mfg. Co., Boston, Mass.
Mico Instrument Co., 10 Arrow St., Cambridge, Mass.
Michigan Tool Co., Detroit, Mich.
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
National Acme Co., Cleveland, Ohio
National Broach Machine Co., 11455 Shoemaker Ave., Detroit, Mich.
Pratt & Whitney Div Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Savage Co., W. J., Clinch Ave. and Tenth St., Knoxville, Tenn.
Service Machine Co., 752 Broadway, Elizabeth, N. J.
Sheffield Gage Corp., Dayton, Ohio.
Snyder Tool & Eng. Co., Detroit, Mich.
Springfield Machine Tool Co., The, 631 West Southern Ave., Springfield, Ohio
Standard Pressed Steel Co., Jenkintown, Pa.
Stokerunit Corp., 4548 W. Mitchell St., Milwaukee, Wis.
Strippit Corp., 1559 Niagara St., Buffalo.
Sundstrand Machine Tool Co., Rockford, Ill.
Taft-Peirce Mfg. Co., The, 32 Mechanic Ave., Woonsocket, R. I.
Torrington Co., The, Field St. Torrington, Conn.
U. S. Tool Co., Inc., Ampere, N. J.
Verdin, Koppes, Verdin Co., 108 W. 2nd St., Cincinnati, Ohio.
Vinco Tool Co., 7350 Central Ave., Detroit, Mich.
Wade Tool Co., 49 River St., Waltham, Mass.
Waltham Machine Works, Waltham, Mass.
Watson-Stillman Co., New York, N. Y.
Whitney Metal Tool Co., Rockford, Ill.
Wiedemann Machine Co., 1815 Sedgley Ave., Philadelphia, Pa.

CONTROL SYSTEMS, Automatic Furnace
American Gas Furnace Co., Elizabeth, N. J.
Foxboro Co., 122 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia, Pa.
Partlow Corp., 2 Campion Road, New Hartford, N. Y.
Strong, Carlisle & Hammond Mach. Co., Cleveland, Ohio
Tagliabue Mfg. Co., C. J., Park & Nostrand Aves., Brooklyn, N. Y.
Wheelco Instruments Co., 1112 Milwaukee Ave., Chicago, Ill.

CONTROLLERS AND STARTERS, Motor
Allen-Bradley Co., 1326 South Second St., Milwaukee, Wis.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Cleveland Elec. Motor Co., 5213 Chester Ave., Cleveland, Ohio
Colt's Patent Fire Arms Mfg. Co., 17 Van Dyke Ave., Hartford, Conn.
Cutler Hammer, Inc., Milwaukee, Wis.
Electric Controller & Mfg. Co., 2700 East 79th St., Cleveland, Ohio
General Electric Co., Schenectady, N. Y.
Lincoln Electric Co., Cleveland, Ohio
Monitor Controller Co., Gay, Lombard & Frederick Sts., Baltimore, Md.
Savage Co., W. J., Clinch Ave. and Tenth St., Knoxville, Tenn.
Ward Leonard Elec. Co., Mount Vernon, N. Y.
Westinghouse Elec. & Mfg. Co., East Pittsburg, Pa.

CONTROLLERS, Temperature
American Gas Furnace Co., Elizabeth, N. J.
Automatic Temperature Control Co., 34 E. Logan St., Pittsburgh, Pa.
Bristol Co., Waterbury, Conn.
Brown Instrument Co. (A Div. of Minneapolis-Honeywell Reg. Co.), 4501 Wayne Ave., Philadelphia, Pa.
Foxboro Co., 122 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia, Pa.
C. J. Tagliabue Mfg. Co., Park & Nostrand Ave., Brooklyn, N. Y.
Taylor & Fenn Co., 94 Arch St., Hartford, Conn.
Wheelco Instruments Co., 1112 Milwaukee Ave., Chicago, Ill.

CONVERTERS
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
General Electric Co., Schenectady, N. Y.

CONVEYOR BELTS, Rubber
Dayton Rubber Mfg. Co., Dayton, Ohio
Gates Rubber Co., Denver, Colo.
Manhattan Rubber Mfg. Co. Div. of Raybestos-Manhattan Inc., Passaic, N. J.

CONVEYOR CHAINS (see Chains, Conveyor)

CONVEYORS
American Mono-Rail Co., 13113 Athens Ave., Cleveland, Ohio
Link-Belt Co., 300 W. Pershing Rd., Chicago.
Mathews Conveyor Co., Elwood City, Pa.
Palmer-Bee Co., Westminster & G.T.R.R., Detroit, Mich.
Savage Co., W. J., Clinch Ave. and Tenth St., Knoxville, Tenn.
Standard Conveyor Co., 315 Second Ave., North St. Paul, Minn.

COPPER
American Brass Co., Waterbury, Conn.
Revere Copper & Brass Corp., 230 Park Ave., New York, N. Y.
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.

CORE OILS
E. F. Houghton Co., 240 W. Somerset St., Philadelphia, Pa.

CORE MACHINE
American Foundry Equipment Co., Mishawaka, Ind.
Osborne Mfg. Co., 5401 Hamilton Ave., Cleveland, Ohio

COUNTERBORES
Butterfield Div. (Union Twist Drill Co.), Derby Line, Vt.
Eclipse Counterbore Co., Detroit, Mich.
Ex-Cell-O Aircraft & Tool Corp., 1200 Oakman Blvd., Detroit, Mich.
Gairing Tool Co., 629 Lafayette Blvd., Detroit, Mich.
Hall Planetary Co., Fox St. & Abbottsford Ave., Philadelphia, Pa.
Haynes Stellite Co., Kokomo, Ind.
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
National Twist Drill & Tool Co., 6522 Brush St., Detroit, Mich.
Palmer-Bee Co., Westminster & G.T.R.R., Detroit, Mich.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Production Tool Co., 6474 LeGrande Ave., Detroit, Mich.
Prosser & Sons, Thos., 15 Gold St., New York, N. Y.
Standard Tool Co., The, 6918 Central Ave., Cleveland, Ohio
Super Tool Co., 605 Boyer Bldg., Detroit.
Union Twist Drill Co., Athol, Mass.
Wesson Co., Detroit, Mich.

COUNTERBORES, Cemented Carbide (see Tools, Cemented Carbide)

COUNTERSHAFTS
American Tool Works Co., Pearl & Eggleston Aves., Cincinnati, Ohio
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Lathe & Tool Co., Oakley, Cincinnati, Ohio.
Dodge Mfg. Corp., Mishawaka, Ind.
Earle Gear & Mach. Co., 4707 Stenton Ave., Philadelphia, Pa.
Hanson Clutch & Machinery Co., Tiffin, Ohio
Hendey Machine Co., 105 Summer St., Torrington, Conn.
LeBlond Machine Tool Co., R. K., Madison and Edwards Roads, Cincinnati, Ohio
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio

COUNTERSINKS
American Swiss File & Tool Co., Elizabeth, N. J.
Butterfield Div. (Union Twist Drill Co.) Derby Line, Vt.
Certified Flexible Couplings, Inc., 122 E. 42nd St., N. Y. City
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio
Eclipse Counterbore Co., Detroit, Mich.
Ex-Cell-O Aircraft & Tool Corp., 1200 Oakman Blvd., Detroit, Mich.
Gairing Tool Co., 629 Lafayette Blvd., Detroit.
Greenfield Tap & Die Corp., Sanderson St., Greenfield, Mass.
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Production Tool Co., 6474 LeGrande Ave., Detroit, Mich.
Standard Tool Co., The, 6918 Central Ave., Cleveland, Ohio
Starrett Co., The L. S., Crescent St., Athol, Mass.
Super Tool Company, 356 E. Congress St., Detroit, Mich.
Union Twist Drill Co., Athol, Mass.
Wesson Co., Detroit, Mich.

COUNTERS and COUNTING MACHINES
Production Instrument Co., 1325 S. Wabash Ave., Chicago, Ill.
Veeder-Root Incorporated, Hartford, Conn.

COUNTERS, Revolution
Bristol Company, Waterbury, Conn.
Production Instrument Co., 1325 So. Wabash Ave., Chicago, Ill.
Sherr Co., Inc., Geo., 128 Lafayette St., New York, N. Y.
Starrett Co., The L. S., Crescent St., Athol, Mass.
Veeder-Root Incorporated, Hartford, Conn.

COUPLINGS, Flexible
Allis-Chalmers Mfg. Co., Milwaukee, Wisc.
Bartlett Hayward Div. Koppers Co., Baltimore, Md.
Boston Gear Works, Inc., North Quincy, Mass.
Chicago Rawhide Mfg. Co., Chicago, Ill.
Continental Diamond Fibre Co., Newark, Delaware
Cullman Wheel Co., Chicago, Ill.
DeLaval Steam Turbine Co., Trenton, N. J.
Delta Mfg. Co., Vienna Ave., Milwaukee, Wis.
Diamond Chain & Mfg. Co., 402 Kentucky Ave., Indianapolis, Ind.
Dodge Mfg. Corp., Mishawaka, Ind.
Earle Gear & Mach. Co., 4707 Stenton Ave., Philadelphia, Pa.
Farrel-Birmingham Co., Inc., 355 Vulcan St., Buffalo, N. Y.
Hanson Clutch & Machinery Co., Tiffin, Ohio
Harris Coupling Co., 265 W. 40th St., New York City
Link-Belt Co., 2410 W. 18th St., Chicago, Ill.
Lovejoy Tool Works, 4956 W. Lake St., Chicago, Ill.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Morse Chain Co., Ithaca, N. Y.
Nicholson & Co., W. H., 114 Oregon St., Wilkes-Barre, Pa.
Palmer-Bee Co., Westminster & G.T.R.R., Detroit, Mich.
Philadelphia Gear Works, Philadelphia, Pa.
Power Transmission Council, 74 State St., Boston, Mass.
Savage Co., W. J., Clinch Ave. and Tenth St., Knoxville, Tenn.
Tite-Flex Metal Hose Co., 500 Frelinghuysen Ave., Newark, N. J.
Waldron Corp., John, New Brunswick, N. J.
Whitney Chain & Mfg. Co., Hartford, Conn.

COUPLINGS, Hose
Chicago Pneumatic Tool Co., 6 E. 44th St., New York

COUPLINGS, Shaft
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Baush Machine Tool Co., 156 Wason Ave., Springfield, Mass.
Boston Gear Works, Inc., North Quincy, Ill.
Cullman Wheel Co., Chicago, Ill.
DeLaval Steam Turbine Co., Trenton, N. J.
Dodge Mfg. Corp., Mishawaka, Ind.
Earle Gear & Mach. Co., 4707 Stenton Ave., Philadelphia, Pa.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Hanson Clutch & Machinery Co., Tiffin, Ohio
Link-Belt Co., 2410 W. 18th St., Chicago, Ill.
W. H. Nicholson & Co., 114 Oregon St., Wilkes-Barre, Pa.
Philadelphia Gear Works, Philadelphia, Pa.
Power Transmission Council, 1 Atlantic St., Stamford, Conn.
Savage Co., W. J., Clinch Ave., and Tenth St., Knoxville, Tenn.

CRANES
American Mono-Rail Co., 13113 Athens Ave., Cleveland, Ohio
Baker-Rauling Co., 2164 W. 25th St., Cleveland, Ohio
Canton Fdry. & Mach. Co., 6400 Breakwater Ave., Cleveland, O.
Chambersburg Engineering Co., Chambersburg, Pa.
Cleveland Crane & Engrg. Co. Wickliffe, Ohio
Curtis Pneumatic Machinery Co., 1924 Kienler Ave., St. Louis, Mo.
Elwell-Parker Electric Co., 4511 St. Clair Avenue, Cleveland, Ohio
Euclid Crane & Hoist Co., Euclid, Ohio
Hanson Clutch & Machinery Co., Tiffin, Ohio
Harnischfeger Corp., 4400 W. National Ave., Milwaukee, Wis.
Northern Engineering Works, Chene & Atwater Sts., Detroit, Mich.
Osborne Mfg. Co., 5401 Hamilton Ave., Cleveland, Ohio.
David Round and Son, Newburgh Station, Cleveland, Ohio
Savage Co., W. J., Clinch Ave., and Tenth St., Knoxville, Tenn.
Yale & Towne Mfg. Co., Philadelphia Div., 4530 Tacony St., Phila., Pa.

CRANES, Overhead Traveling
American Mono-Rail Co., 13113 Athens Ave., Cleveland, Ohio
Chambersburg Engineering Co., Chambersburg, Pa.
Cleveland Crane & Engrg. Co., Wickliffe, Ohio
Curtis Pneumatic Machinery Co., 1924 Kienlen Ave., St. Louis, Mo.
Electro Lift, Inc., 30 Church St., New York City
Harnischfeger Corp., 4400 W. National Ave., Milwaukee, Wis.
Independent Pneumatic Tool Co., Chicago, Ill.
Morgan Engineering Co., Alliance, Ohio
Northern Engineering Works, Chene & Atwater Sts., Detroit, Mich.
David Round and Son, Newburgh Station, Cleveland, Ohio
Savage Co., W. J., Clinch Ave., and Tenth St., Knoxville, Tenn.
Yale & Towne Mfg. Co., Philadelphia Div., 4530 Tacony St., Phila., Pa.

CRANES, Portable Floor
Baker-Raulang Co., 2164 W. 25th St., Cleveland, Ohio
Canton Fdry. & Mach. Co., 6400 Breakwater Ave., Cleveland, Ohio
Canedy-Otto Mfg. Co., Chicago Heights, Ill.
Elwell-Parker Electric Co., 4511 St. Clair Ave., Cleveland, Ohio
David Round and Son, Newburgh Station, Cleveland, Ohio
Savage Co., W. J. Clinch Ave., and Tenth St., Knoxville, Tenn.

CRIMPERS
E. W. Bliss Co., Brooklyn, N. Y.
Cincinnati Shaper Co., Cincinnati, Ohio
Niagara Mach. & Tool Wks., Buffalo, N. Y.

CRIMPERS, Wire
Automatic Machine Co., Bridgeport, Conn.

CRUSHERS, Steel Chip, Stationary and Portable
Marburg Brothers, Inc., 90 West St., New York, N. Y.

CUSHIONS, Die
Marquette Tool & Mfg. Co., Toledo, Ohio
V. & O. Press Co., Hudson, N. Y.

CUTTER BLADES, Milling, Boring and Reaming
Brown & Sharpe Mfg. Co., Providence, R. I.
Carboloy Co., Inc., 2987 E. Jefferson Ave., Detroit, Mich.
Colonial Broach Co., Detroit, Mich.
Davis Boring Tool Co. (Div. Larkin Packer Co.) 6200 Maple Ave., St. Louis, Mo.
Detroit Tap & Tool Co., Detroit, Mich.
Ex-Cell-O Aircraft & Tool Corp., 1200 Oakman Blvd., Detroit, Mich.
Gairing Tool Co., 629 Lafayette Blvd., Detroit, Mich.
Gisholt Machine Co., 1201 E. Washington Ave., Madison, Wis.
Gorham Tool Co., 14400 Woodrow Wilson Ave., Detroit, Mich.
Haynes Stellite Co., Kokomo, Indiana.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
Ingersoll Milling Machine Co., Rockford, Ill.
Kelly Reamer Co., 3775 Ridge Road, Cleveland, Ohio
McCrosky Tool Corporation, 1340-80 South Main St., Meadville, Pa.
Michigan Tool Co., Detroit, Mich.
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
National Broach & Machine Co., 11455 Shoemaker Ave., Detroit, Mich.
National Twist Drill & Tool Co., 6522 Brush St., Detroit, Mich.
Pratt & Whitney Div. Niles-Bement-Pond Co., 435 Capitol Ave., Hartford, Conn.
Production Tool Co., 6474 Le Grande Ave., Detroit, Mich.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Union Twist Drill Co., Athol, Mass.
Wesson Co., Detroit, Mich.

CUTTERS, Angle
Barber-Colman Co., River & Loomis Sts., Rockford, Ill.
Eclipse Counterbore Co., Detroit, Mich.
Ex-Cell-O Aircraft and Tool Corp., 1200 Oakman Blvd., Detroit, Mich.
Gairing Tool Co., 629 Lafayette Blvd., Detroit, Mich.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.

CUTTERS, Die Sinking
Colonial Broach Co., Detroit, Mich.
Detroit Tap & Tool Co., Detroit, Mich.
Eclipse Counterbore Co., Detroit, Mich.
Gairing Tool Co., 629 Lafayette Blvd., Detroit
George Gorton Machine Co., 1107 13th St., Racine, Wis.
Gorham Tool Co., 14400 Woodrow Wilson Ave., Detroit, Mich.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
Michigan Tool Co., Detroit, Mich.
Morse Twist Drill & Machine Co., 163 Pleasant St., New Bedford, Mass.
National Twist Drill & Tool Co., 6522 Brush St., Detroit, Mich.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Tomkins-Johnson Co., The, 615 N. Mechanic St., Jackson, Mich.
Union Twist Drill Co., Athol, Mass.

CUTTERS, Formed
Atkins & Co., E. C., Indianapolis, Ind.
Barber-Colman Co., Rockford, Ill.
Brown & Sharpe Mfg. Co., Providence, R. I.
Carboloy Co., Inc., 2987 E. Jefferson Ave., Detroit, Mich.
Cleveland Twist Drill Co., Cleveland, Ohio
Colonial Broach Co., Detroit, Mich.
Consolidated Machine Tool Corp., Rochester, N. Y.
Detroit Tap & Tool Co., Detroit, Mich.
Henry Disston & Sons, Inc., Tacony, Philadelphia, Pa.
Eclipse Counterbore Co., Detroit, Mich.
Ex-Cell-O Aircraft & Tool Corp., Detroit
Gairing Tool Co., 629 Lafayette Blvd., Detroit
Gammons Halmon Co., Manchester, Conn.
Gorham Tool Co., 14400 Woodrow Wilson Ave., Detroit, Mich.
Gorton Machine Co., Geo., Racine, Wis.
Greenfield Tap & Die Corp., Greenfield, Mass.
Haynes Stellite Co., Kokomo, Ind.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
Ingersoll Milling Machine Co., Rockford, Ill.
Kelly Reamer Co., 3775 Ridge Road, Cleveland, Ohio
Morrison Machine Products, Inc., Elmira, N. Y.
Morse Twist Drill & Machine Co., New Bedford, Mass.
National Twist Drill & Tool Co., Detroit, Mich.
O. K. Tool Co., Shelton, Conn.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Production Tool Co., Detroit, Mich.
Producto Machine Co., Bridgeport, Conn.
Reed-Prentice Corp., Worcester, Mass.
Standard Tool Co., Cleveland, Ohio
Super Tool Co., Detroit, Mich.
Tomkins Johnson Co., Jackson, Mich.
Union Twist Drill Co., Athol, Mass.
Waltham Machine Works, Waltham, Mass.
Wesson Co., Detroit, Mich.

CUTTERS, Gear
Apex Tool & Cutter Co., Shelton, Conn.
Bantam Ball Bearing Co., 3702 W. Sample St., South Bend, Ind.
Bilgram Gear & Machine Works, 1235 Spring Garden St., Philadelphia, Pa.
Brown & Sharpe Mfg. Co., Providence, R. I.
Chicago Rawhide Mfg. Co., Chicago, Ill.
Clough, A. W., Meriden, Conn.
Colonial Broach Co., Detroit, Mich.
Cross Gear & Machine Co., 3250 Bellevue, Detroit, Mich.
Farrell-Birmingham Co., Inc., 355 Vulcan St., Buffalo, N. Y.
Fellows Gear Shaper Co., 78 River St., Springfield, Vt.
General Machinery Corp. (Niles Tool Wks. Div.), 545 N. Third St., Hamilton, Ohio
Gleason Works, 1000 University Ave., Rochester, N. Y.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
Michigan Tool Co., Detroit, Mich.
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
National Twist Drill & Tool Co., 6522 Brush St., Detroit, Mich.
O. K. Tool Co., Shelton, Conn.
Standard Tool Co., The, 6918 Central Ave., Cleveland, Ohio
Union Twist Drill Co., Athol, Mass.
Waltham Machine Works, Waltham, Mass.

CUTTERS, Keyseater
Baker Bros., Inc., Post St., Toledo, Ohio
Barber-Colman Co., River & Loomis Sts., Rockford, Ill.
Brown & Sharpe Mfg. Co., Providence, R. I.
Colonial Broach Co., Detroit, Mich.
Davis Keyseater Co., Rochester, N. Y.
Detroit Tap & Tool Co., Detroit, Mich.
Ex-Cell-O Aircraft & Tool Corp., 1200 Oakman Blvd., Detroit, Mich.
Gorham Tool Co., 14400 Woodrow Wilson Ave., Detroit, Mich.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
Michigan Tool Co., Detroit, Mich.
Mitts & Merrill, 913 Tilden St., Saginaw, Mich.
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
Morton Mfg. Co., Muskegon Heights, Mich.
National Broach & Machine Co., 11455 Shoemaker Ave., Detroit, Mich.
National Twist Drill & Tool Co., 6522 Brush St., Detroit, Mich.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Standard Tool Co., The, 6918 Central Ave., Cleveland, Ohio
Union Twist Drill Co., Athol, Mass.

CUTTERS, Milling
Apex Tool & Cutter Co., Shelton, Conn.
Atkins & Co., E. C., 424 S. Illinois St., Indianapolis, Ind.
Barber-Colman Co., Rockford, Ill.
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio
Colonial Broach Co., Detroit, Mich.
Consolidated Machine Tool Corp., Rochester, N. Y.
Detroit Tap & Tool Co., Detroit, Mich.
Eclipse Counterbore Co., Detroit, Mich.
Ex-Cell-O Aircraft & Tool Corp., 1200 Oakman Blvd., Detroit, Mich.
Gairing Tool Co., 629 Lafayette Blvd., Detroit
Gammons Holman Co., 405 Main St., Manchester, Conn.
Gorham Tool Co., 14400 Woodrow Wilson Ave., Detroit, Mich.
George Gorton Machine Co., 1103 13th St., Racine, Wis.
Haynes Stellite Co., Kokomo, Ind.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
Ingersoll Milling Machine Co., Rockford, Ill.
Kearney & Trecker Corp., Milwaukee, Wis.
Kelly Reamer Co., 3775 Ridge Road, Cleveland, Ohio
McCrosky Tool Corp., 1340-80 S. Main St., Meadville, Pa.
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
National Twist Drill & Tool Co., 6522 Brush St., Detroit, Mich.
O. K. Tool Co., Shelton, Conn.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Production Tool Co., 6474 LeGrande Ave., Detroit, Mich.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Reed-Prentice Co., 677 Cambridge St., Worcester, Mass.
Standard Tool Co., The, 6918 Central Ave., Cleveland, Ohio
Super Tool Co., 605 Boyer Bldg., Detroit, Mich.
Tomkins-Johnson Co., The, 615 N. Mechanic St., Jackson, Mich.
Union Twist Drill Co., Athol, Mass.
Waltham Machine Works, Waltham, Mass.
Wesson Co., Detroit, Mich.

CUTTERS, Milling, Cemented Carbide (see Tools, Cemented Carbide)

CUTTERS, Pipe, Hand
Ridge Tool Co., Elyria, Ohio

CUTTERS, Spotfacing
Carboloy Co., Inc., 2987 E. Jefferson Ave., Detroit, Mich.
Eclipse Counterbore Co., Detroit, Mich.
Ex-Cell-O Aircraft and Tool Corp., 1200 Oakman Blvd., Detroit, Mich.
Gairing Tool Co., 629 Lafayette Blvd., Detroit
Haynes-Stellite Co., Harrison & Lindsay Sts., Kokomo, Ind.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
Morse Twist Drill & Machine Co., 163 Pleasant St., New Bedford, Mass.
National Twist Drill & Tool Co., 6522 Brush St., Detroit, Mich.
Standard Tool Co., 6918 Central Ave., S. E., Cleveland, Ohio

CUTTERS, Welch Plug
Carboloy Co., Inc., 2987 E. Jefferson Ave., Detroit, Mich.
Eclipse Counterbore Co., Detroit, Mich.
Gairing Tool Co., 629 Lafayette Blvd., Detroit

CUTTING AND WELDING APPARATUS
Air Reduction Sales Co., 60 E. 42nd St., New York, N. Y.
Linde Air Products Co., 30 E. 42nd St., New York, N. Y.
Oster Mfg. Co., The, 2057 E. 61st Pl., Cleveland, Ohio

CUTTING COMPOUNDS (see Compounds, Cutting)

CUTTING MACHINES, Flame
Air Reduction Sales Co., 60 E. 42nd St., New York, N. Y.
Linde Air Products Co., 30 E. 42nd St., New York, N. Y.

CUTTING-OFF MACHINES, Abrasive Wheel
Bethlehem Fdry. & Mach. Co., Bethlehem, Pa.
Bridgeport Safety Emery Wheel Co., Inc., Bridgeport, Conn.
Andrew C. Campbell Division (Amer. Chain & Cable Co. Inc.), 929 Connecticut Ave., Bridgeport, Conn.
Challenge Machinery Co., Grand Haven, Mich.
Cochrane-Bly Co., 15 St. James Pl., Rochester, N. Y.
DeSanno, A. P., & Sons, Philadelphia, Pa.
DeWalt Products Corp., Fountain Ave., Lancaster, Pa.
Mesta Machine Company, Post office Box 1466, Pittsburgh, Pa.
Oliver Machinery Co., Grand Rapids, Mich.
Racine Tool & Machine Co., 1751 State St., Racine, Wis.
Standard Electrical Tool Co., 1940 W. 8th St., Cincinnati, Ohio
Tabor Mfg. Co., 6225 Tacony St., Philadelphia, Pa.

CUTTING-OFF MACHINES, Hack and Band Saw
Armstrong-Blum Mfg. Co., 333 N. Francisco Ave., Chicago, Ill.
Atkins & Co., E. C. 424 S. Illinois St., Indianapolis, Ind.

CUTTING-OFF MACHINES, Hack & Band (Cont.)

Boice Crane Co., Toledo, Ohio
Cochrane-Bly Co., 15 St. James Pl., Rochester, N. Y.
Continental Mach. Spec. Inc., Minneapolis, Minn.
Delta Mfg. Co., Vienna Ave., Milwaukee, Wis.
DeWalt Products Corp., Fountain Ave., Lancaster, Pa.
Laidlaw, Wm., Inc., 7 Greenwich St., Belmont, N. Y.
Marburg Brothers, Inc., 90 West St., New York, N. Y.
Racine Tool & Machine Co., 1751 State St., Racine, Wis.
Jos. T. Ryerson & Son, Inc., 2558 W. 16th St., Chicago, Ill.

CUTTING-OFF MACHINES, Cold Saw

Bethlehem Fdry. & Mach. Co., Bethlehem, Pa.
Cochrane-Bly Co., 15 St. James Pl., Rochester, N. Y.
Consolidated Machine Tool Corp., Rochester, N. Y.
Earle Gear & Machine Co., 4723 Stenton Ave., Philadelphia, Pa.
United Engrg. & Fdry. Co., Pittsburgh, Pa.

CUTTING-OFF MACHINES, Pipe

Automatic Machine Co., Bridgeport, Conn.
Beaver Pipe Tools, Inc., 1937 Amma Ave., Warren, Ohio
Bethlehem Fdry. & Mach. Co., Bethlehem, Pa.
Cochrane-Bly Co., 15 James Pl., Rochester, N. Y.
DeWalt Products Corp., Fountain Ave., Lancaster, Pa.
Landis Machine Co., Inc., Church & 5th Sts., Waynesboro, Pa.
Murchey Machine & Tool Co., 951 Porter St., Detroit, Mich.
Oster Mfg. Co., The, 2057 E. 61st Pl., Cleveland, Ohio
Rickert-Shafer Co., 613 W. 11th St., Erie, Pa.
Scherr Co., Inc., Geo., 128 Lafayette St., New York, N. Y.
United Engrg. & Fdry. Co., Pittsburgh, Pa.
Western Tool & Mfg. Co., Springfield, Ohio

CUTTING-OFF TOOLS

Armstrong Bros., Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Atkins & Co., E. C., 424 S. Illinois St., Indianapolis, Ind.
Beaver Pipe Tools, Inc., 1937 Amma Ave., Warren, Ohio
Brown & Sharpe Mfg. Co., Providence, R. I.
Carpenter Steel Co., 109 W. Bern St., Reading, Pa.
Cincinnati Lathe & Tool Co., Oakley, Cincinnati, Ohio
Colonial Broach Co., Detroit, Mich.
Columbia Tool Steel Co., 425 E. 14th St., Chicago, Ill.
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.
Gorham Tool Co., 14400 Woodrow Wilson Ave., Detroit, Mich.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
Macklin Co., Jackson, Mich.
Michigan Tool Co., Detroit, Mich.
Morse Twist Drill & Machine Co., 163 Pleasant St., New Bedford, Mass.
National Broach Machine Co., 11455 Shoemaker Ave., Detroit, Mich.
Pratt & Whitney Div. Niles-Bement-Pond Co., 435 Capitol Ave., Hartford, Conn.
Ready Tool Co., The, 550 Iranistan Ave., Bridgeport, Conn.
Stark Tool Co., Waltham, Mass.
Sterling Grinding Wheel Co., Broad Ave., Tiffin, Ohio
Super Tool Company, 356 E. Congress St., Detroit, Mich.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio
Wesson Co., Detroit, Mich.
Western Tool & Mfg. Co., Springfield, Ohio

CUTTING-OFF TOOLS, Cemented Carbide (see Tools, Cemented Carbide)

CUTTING OFF WHEELS, Abrasive

Carborundum Co., Niagara Falls, N. Y.
DeSanno, A. P. & Sons, Inc., 1615 McKean St., Philadelphia, Pa.
Norton Co., Worcester, Mass.
Manhattan Rubber Mfg. Co., Div. of Raybestos-Manhattan Inc., Passaic, N. J.

CYLINDER GRINDERS

Hutto Division of Carborundum Co., 515 Lycaste Ave., Detroit, Mich.
Moline Tool Co., 102-20th St., Moline, Ill.

CYLINDER GRINDING HONES

American Hollow Boring Co., Erie, Pa.
Carborundum Co., Niagara Falls, N. Y.
Norton Co., Worcester, Mass.

CYLINDERS, Air and Hydraulic

Hannifin Manufacturing Co., 621 South Kolmar Ave., Chicago, Ill.
Tomkins-Johnson Co., 515 N. Mechanic St., Jackson, Mich.

CYLINDRICAL SQUARES

Taft-Peirce Mfg. Co., The, 32 Mechanic Ave., Woonsocket, R. I.

DEGREASING, Machines

Detroit Rex Products Co., 13005 Hillview Ave., Detroit, Mich.

DEALERS, Machinery (See Searchlight Section)

Atlas Equipment Co., 116 S. Clinton St., Chicago, Ill.
Adams, Ogden R., 266 State Street, Rochester, N. Y.
Advance Machinery Exchange, Inc., 182 Centre St., N. Y. C.
Alliance Machinery Exchange, 206 Centre St., N. Y. C.
Beal & Co., Jos., 465 Atlantic Avenue, Boston
Beatty Machy. & Mfg. Co., 948 150th St., Hammond, Indiana
Belyea Co., Inc., 151 W. 18th St., N. Y. C.
Bennett-Rafkin Machy. Co., 30 Church St., N. Y. C.
Bernstein, G. M., 10 So. Clinton St., Chicago
Botwink Bros., Inc., New Haven, Conn., (67 Water Street)
Bradley Machinery Co., 529 E. Jefferson Ave., Detroit, Mich.
Brandt, W. E., 513 Empire Bldg., Pitts., Pa.
Buffalo Machy. Co., 833 Grant St., Buffalo
Cincinnati Machy. & Supply Co., 28 West 2nd Street, Cincinnati, Ohio
Delta Equipment Co., 148 North Third St., Phila., Penna.
Dony Machine Co., D. E., 1115 Bay St., Rochester, N. Y.
Eastern Machinery Co., 3260 Spring Grove Ave., Cincinnati, Ohio
Emerman & Co., Louis E., 1761 Elston Ave., Chicago, Ill.
Falk Mill Supply Co., Inc., 18 Ward St., Rochester, N. Y.
Fraser, E. L., 141 N. Third St., Phila., Penna.
Ganey Machinery Co., 125 Arthur St., Buffalo
General Machinery Corp., 140 Federal St., Boston, Mass.
Goldman & Co., Harvey H., 10567 Gratiot Ave., Detroit, Mich.
Hill-Clarke Machinery Co., 651 W. Washington, Blvd., Chicago, Ill.
Hyman & Son, Jos., Tioga, Livingston & Almond Sts., Philadelphia, Pa.
Indianapolis Machy. & Supply Co., 1959 S. Meridian St., Indianapolis, Ind.
Industrial Equipment Co., 850 Broad St., Newark, N. J.
Industrial Machy. Co., 2100 Fletcher Ave., Indianapolis, Ind.
International Machinery Co., 3171 Bellevue Ave., Detroit, Mich.
Interstate Machinery Co., 130 S. Clinton St., Chicago, Ill.
Iron & Steel Products Co., Railway Exchange, Chicago, Ill.
Iroquois Machinery Co., 662 Ohio St., Buffalo
Land, L. J., 140 Grand St., New York City
Leach Machinery Co., H., 296 Dyer St., Providence, R. I.
Lucas & Son, Inc., J. L., 3 Fox St., Bridgeport, Conn.
Lunney, Frank J., 953 N. Front St., Phila, Pa.
Machinery Dealers, Inc., 419 Chapel St., New Haven, Conn.
McCabe & Sheeran Machy. Corp., 50 Church St., N. Y. C.
Marr-Galbreath Machinery Co., 57 Water St., Pittsburgh, Penna.
Midwest Equipment Co., 630 W. Lake St., Chicago, Ill.
Miles Machinery Co., Saginaw, W. S. Mich.
Monarch Machinery Co., 329 No. Third St., Phila., Penna.
Morey Machinery Co., Inc., 410 Broome St., New York City.
Motor Repair & Mfg. Co., The, 1548 Hamilton Ave., Cleveland, Ohio
Mover, J. N., 465 North 5th St., Philadelphia, Penna.
O'Brien Machinery Co., 113 North 13th St., Philadelphia, Penna.
Ott Machinery Sales, Inc., 546 Second Ave., Detroit, Mich.
Patron-Millwright Machy. & Transmission Co., 154 Grand St., N. Y.
Reliance Machy. Sales, Co., 1407 Brighton Rd. N.S., Pttsburgh, Penna.
Reynolds & Son, Inc., Geo. T., 171 Pine St., Providence, R. I.
Riverside Machinery Depot, 251 St. Aubin Ave., Detroit, Michigan
Rosenkranz & Weisbecker, 149 Broadway, New York City
Ross Power Equipt. Co., Indianapolis, Ind.
Scott-Bansbach Machy. Co., 4611 W. 20th St., Chicago, Ill.
Segal Machinery Co., 113 S. Clinton St., Chicago, Ill.
Simmons Machine Tool Corp., N. Broadway, Albany, New York
Standard Machinery & Supply Co., The, 218 High St., Boston, Mass.
Strong Carlisle & Hammond Co., 1392 W. 3rd St., Cleveland, Ohio
Sun Machinery Co., Inc., 39 Van Buren St., Newark, N. J.
Surplus Material & Machy. Co., 8733 Kercheval Ave., Detroit, Mich.
Telephone Co., Pittsfield, Mass.
Vine, R. A., 652 W. Willis Ave., Detroit
Victor Machinery Co., 128 S. Clinton St., Chicago, Ill.
Wiener Machy. Co., 237 Centre St., N. Y. C.
West Penn Machy. Co., 1208 House Building, Pittsburgh, Penna.
Wigglesworth Machy. Co., 199 Bent St., Cambridge, Mass.
Wroe Co., C. I., 11 Park Place, New York City
Wyatt Machinery Co., C. G., 1203 Princess Ave., Camden, N. J.

DEALERS, Machinery (see Searchlight Section)

DECORATIVE METAL PARTS

Crowe Name Plate and Mfg. Co., 1749 Grace St. Chicago, Ill.

DEEP DRAWING AND STAMPING SHEETS (see Steel, Sheet)

DEMAGNETIZERS

Abrasive Machine Tool Co., E. Providence, R. I.
Blanchard Machine Co., 64 State St., Cambridge, Mass.
Frampton Electrical Equipment Co., Dayton, Ohio
Taft-Peirce Mfg. Co., Woonsocket, R. I.
O. S. Walker Co., Worcester, Mass.

DIAL INDICATORS (see Gages, Dial)

DIALS FOR CLOCKS, Instruments, Etc.

Crowe Name Plate and Mfg. Co., 1749 Grace St., Chicago, Ill.

DIAMONDS AND DIAMOND TOOLS

Desmond-Stephan Mfg. Co., Urbana, Ohio
F. F. Gilmore & Co., 112 Dartmouth St., Boston, Mass.
George Gorton Machine Co., Racine, Wis.
Kent-Owens Machine Co., Toledo, Ohio
Karelsen, Inc., E., New York, N. Y.
Norton Company, Worcester, Mass.
Stark Tool Co., Waltham, Mass.
Wesson Co., Detroit, Mich.

DIAMOND GRINDING WHEELS

Carborundum Co., Niagara Falls, N. Y.
Norton Co., 1 New Bond St., Worcester, Mass.
Prosser and Sons, Co., Thos., New York

DIAMONDS, Industrial

Arthur A. Crafts & Co., 532 Commonwealth Ave., Boston, Mass.
Wheel Trueing Tool Co., Detroit, Mich.

DIE CASTING MACHINES

Hannifin Mfg. Co., 621 S. Kolmar Ave., Chicago, Ill.
Kux-Lohner Machine Co., 2145 Lexington St., Chicago, Ill.
Reed-Prentice Co., Worcester, Mass.

DIE CASTINGS (see Castings Die)

DIE CUTTING MACHINES

The Cincinnati Milling Machine Co., Cincinnati, Ohio
George Gorton Machine Co., 1103-13th St., Racine, Wis.
Grob Bros., Grafton, Wis.
Marburg Bros., Inc., 90 West St., New York
Oliver Instrument Co., Adrian, Mich.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Reed-Prentice Co., Worcester, Mass.

DIE CUSHIONS

Driver-Harris Co., Harrison, N. J.
B. F. Goodrich Co., 576 South Main St., Akron, Ohio
Marquette Tool & Mfg. Co., Toledo, O.

DIE HEADS, Self-Opening

Eastern Machine Screw Corp., New Haven, Conn.
Geometric Tool Co., New Haven, Conn.
Jones & Lamson Machine Co., Springfield, Vt.
Landis Machine Co., Inc., Waynesboro, Pa.
Murchey Machine and Tool Co., Detroit, Mich.
National Acme Co., Cleveland, Ohio
Rickert Shafer Co., Erie, Pa.

DIE HEADS, Solid Adjustable

Eastern Machine Screw Corp., New Haven, Conn.
Errington Mech. Laboratory, 24 Norwood Ave., Stapleton, Staten Island, N. Y.
Geometric Tool Co., Lake & Valley Sts., New Haven, Conn.
Landis Machine Co., Inc., Church and 5th Sts., Waynesboro, Pa.
Murchey Machine & Tool Co., 951 Porter St., Detroit, Mich.

DIE MAKER'S BLUE

Dykem Co., The, St. Louis, Mo.

DIE MAKERS' SUPPLIES

Baumbach Mfg. Co., E. A., Chicago, Ill.
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Lathe and Tool Co., Oakley, Cincinnati, Ohio
Cunningham Co., M. E., 107 E. Carson St., Pittsburgh, Pa.

DIE MAKER'S SUPPLIES (Cont.)
Danly Machine Specialties, Inc., Chicago, Ill.
Marburg Bros. Co., Inc., 90 West St., New York, N. Y.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
U. S. Tool Co., Inc., Ampere, N. J.

DIE MAKING MACHINES (see Die Cutting Machines)

DIE SAWING AND FILING MACHINES (see Filing Machines and Sawing Machines)

DIE SETS
Baumbach Mfg. Co., E. A., Chicago, Ill.
Card Mfg. Co., S. W., (Div. Union Twist Drill), Mansfield, Mass.
Danly Machine Specialties Inc., Chicago, Ill.
Morse Twist Drill & Machine Co., New Bedford, Mass.
Producto Machine Co., Bridgeport, Conn.
U. S. Tool Co., Inc., Ampere, N. J.

DIE SHAPERS
S. W. Card Mfg. Co., (Div. Union Twist Drill Co.) Rumford Ave., Mansfield, Mass.
Cochrane-Bly Co., Rochester, N. Y.
Hanson-Whitney Machine Co., 169 Bartholomew Ave., Hartford, Conn.

DIE STEELS (see Steels, Die)

DIE STOCKS (see Stocks, Die)

DIES, Adjustable and Self-Opening
Acme Machinery Co., 4533 St. Clair Ave., N. E. Cleveland, Ohio
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Beaver Pipe Tools, Inc., 1937 Amma Ave., Warren, Ohio
Card Mfg. Co., S. W. (Div. Union Twist Drill) Mansfield, Mass.
Consolidated Machine Tool Corp., Rochester, N. Y.
Eastern Machine Screw Corp., New Haven, Conn.
Errington Mechanical Laboratory, Stapleton, Staten Island, N. Y.
Geometric Tool Co., New Haven, Conn.
Greenfield Tap and Die Corp., Greenfield, Mass.
Jones & Lamson Machine Co., Springfield, Vt.
Landis Machine Co., Inc., Waynesboro, Pa.
Murchey Machine and Tool Co., Detroit, Mich.
National Acme Company, Cleveland, Ohio
Oster Mfg. Co., Cleveland, Ohio
Pipe Machinery Co., Cleveland, Ohio
Rickert-Shafer Co., Erie, Pa.
Union Twist Drill Co., Athol, Mass.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio

DIES, Bronze, for forming and drawing
Ampco Metal Co., Milwaukee, Wis.
Cerro de Pasco Copper Corp., 44 Wall St., New York, N. Y.

DIES, Drawing and Extrusion
Driver-Harris Co., Harrison, N. J.
Taft-Peirce Mfg. Co., Woonsocket, R. I.

DIES, Drawing and Extrusion, Cemented Carbide
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
Ludlum Steel Co., Watervliet, N. Y.
Tungsten Elec. Corp., 540-39th St., Union City, N. J.

DIES, Round Adjustable
Butterfield Div. (Union Twist Drill Co.) Derby Line, Vt.
S. W. Card Mfg. Co., (Div. Union Twist Drill Co.) Rumford Ave., Mansfield, Mass.
Greenfield Tap and Die Corp., Greenfield, Mass.
Morse Twist Drill and Machine Co., New Bedford, Mass.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Standard Tool Co., Cleveland, Ohio
Union Twist Drill Co., Athol, Mass.

DIES, Sheet Metal and Sub Press (see Contract Work)

DIES, Solid, Bolt Pipe
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Beaver Pipe Tools, Inc., 1937 Amma Ave., Warren, Ohio
Butterfield Div. (Union Twist Drill Co.), Derby Line, Vt.
Card Mfg. Co., S. W. (Div. Union Twist Drill) Mansfield, Mass.
Consolidated Machine Tool Corp., Rochester, N. Y.
Greenfield Tap and Die Corp., Greenfield, Mass.
Morse Twist Drill and Machine Co., New Bedford, Mass.
Oster Mfg. Co., Cleveland, Ohio
Rickert-Shafer Co., Erie, Pa.
U. S. Tool Co., Inc., Ampere, N. J.

DIES, Steel Marking
Noble and Westbrook Mfg. Co., East Hartford, Conn.

DIES, Thread Rolling
Bath and Co., John, Worcester, Mass.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.

DIESEL ENGINES FOR MAIN POWER OR STAND-BY SERVICE (see Engines, Diesel)

DISKS, Circular Cutting
Atkins, E. C., and Co., 402 S. Illinois St., Indianapolis, Ind.
Morse Twist Drill and Machine Co., New Bedford, Mass.

DIVIDERS
Brown & Sharpe Mfg. Co., Providence, R. I.
Lufkin Rule Co., Saginaw, Mich.
Starrett Co., The L. S., Athol, Mass.

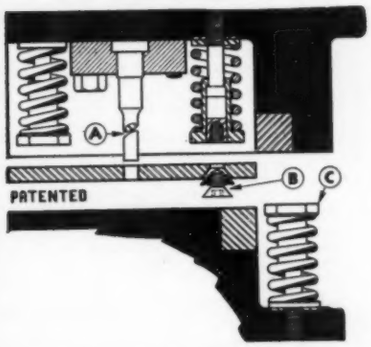
DOGS, LATHE, MILLING MACHINE, ETC.
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Bonney Forge & Tool Work, Allentown, Pa.
Cincinnati Lathe and Tool Co., Oakley, Cincinnati, Ohio
Hendey Machine Co., Torrington, Conn.
LeBlond Machine Tool Co., R. K., Cincinnati
Ready Tool Co., The, Bridgeport, Conn.
J. H. Williams & Co., 75 Spring St., New York

DOWEL PINS
Pittsburgh Steel Co., Pittsburgh, Pa.
Producto Machine Co., Bridgeport, Conn.
U. S. Tool Co., Ampere, N. J.

DRAFTING MACHINES
Universal Drafting Machine Co., Cleveland
Wright Inc., L. G., Cleveland, Ohio

DRAFTING TABLES
Wright Inc., L. G., 5209 Eucild Ave., Cleveland, Ohio

STRIPPIT . . . THE MOST DEPENDABLE & ECONOMICAL STRIPPING DEVICE MADE

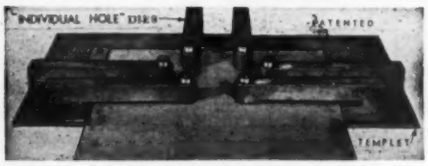


A—Broken punches may be replaced without delay.
B—Stripper can be removed with die in press by removing screws.
C—No stripper plate required for stripping scrap — Strippits alone will strip it.

Write for Catalog 4

AND

WALES ADJUSTABLE HOLE PUNCHING DIES



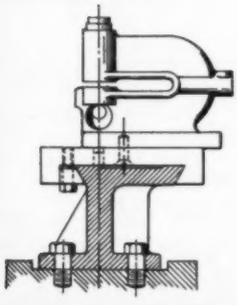
"Make a Templet and You Have a Die"

NEVER BECOME OBSOLETE. When you change models you reset them to make the new parts. Small runs are made on BENCH set-up. Holes in straight lines on PRESS BRAKES. Holes scattered over parts on PUNCH PRESSES. These "INDIVIDUAL HOLE" dies are self contained with the punch and die in the same holder, thus eliminating die setting. Will punch 7/8" holes in 14 gauge steel or under.

Write for Catalog 5

AND

WALES ADJUSTABLE PRESS BRAKE DIES



Standard Wales Notching and Piercing Dies can now be used in a Press Brake. Adapters permit lengthwise adjustment of a number of dies. Speed of adjustment and ease of operation is afforded. Write for Catalog 5.

STRIPPIT PRODUCTS
STRIPPITS
ADJUSTABLE HOLE PUNCHING DIES
ADJUSTABLE NOTCHING DIES
ADJUSTABLE PRESS BRAKE DIES
AIRCRAFT SHAPES PIERCING DIES

THE STRIPPIT CORP.
1559 Niagara St., Buffalo

DRAFTING TEMPLATES
Wright Inc., L. G., Cleveland. Ohio

DRAFTS, Drill
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Morse Twist Drill and Machine Co., New Bedford, Mass.

DRAWING BOARDS
H. E. Twomley, 7154 Magnolia Ave., Riverside, Calif.

DRAWING MATERIALS
Wade Instrument Co., Cleveland, Ohio

DRESSERS, Grinding Wheel
Atkins & Co., E. C., Indianapolis, Ind.
Carboloy Co., Inc., 2987 E. Jefferson Ave., Detroit, Mich.
Carborundum Co., Niagara Falls, N. Y.
Desmond-Stephan Mfg. Co., Urbana, Ohio
Dumore Co., The, Racine, Wis.
Gilmore & Co., F. F., Boston, Mass.
Hanchett Mfg. Co., Big Rapids, Mich.
Karelsen, Inc., E., New York, N. Y.
Kershaw, F. A., Kent, Ohio
Norton Co., 1 New Bond St., Worcester, Mass.
Standard Tool Co., Cleveland, Ohio
Vincent Steel Process Co., 2434 Bellevue Ave., Detroit, Mich.
Vinco Tool Co., 7350 Central Ave., Detroit
Western Tool & Mfg. Co., Springfield, Ohio

DRILL CASES
Cleveland Twist Drill Co., Cleveland, Ohio
Greenfield Tap & Die Corp., Greenfield, Mass.
Huot Mfg. Co., St. Paul Minn.
Morse Twist Drill & Mach. Co. New Bedford, Mass.
National Twist Drill & Tool Co., Detroit
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Standard Tool Co., Cleveland, Ohio
Union Twist Drill Co., Athol, Mass.
Van Dorn Electric Tool Co., 716 Joppa Road, Towson, Md.

DRILL COLLAR FORGINGS, Hollow Bored
American Hollow Boring Co., Erie, Pa.

DRILL DRIFTS
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Morse Twist Drill & Machine Co., 163 Pleasant St., New Bedford, Mass.
Standard Tool Co., 6918 Central Ave., S. E., Cleveland, Ohio

DRILL HOLDERS
Armstrong Bros. Tool Co. 315 N. Francisco Ave., Chicago, Ill.

DRILL ROD, Tool Steel
Carpenter Steel Co., 109 W. Bern St., Reading, Pa.
Crucible Steel Co. of America, New York
Henry Disston & Sons, Inc., Tacony, Philadelphia, Pa.
Latrobe Electric Steel Co., 2626 Ligonier St., Latrobe, Pa.
Ludlum Steel Co., Watervliet, N. Y.
Jos. T. Ryerson & Son, Inc., 2558 W. 16th St., Chicago, Ill.
Vanadium Alloys Steel Co., Pittsburgh, Pa.
Verdin, Kopper, Verdin Co., 108 W. 2nd St., Cincinnati, Ohio

DRILL SOCKETS
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Buhr Machine Co., Ann Arbor, Mich.
Cleveland Twist Drill Co., Cleveland, Ohio
Greenfield Tap and Die Corp., Greenfield, Mass.
Morse Twist Drill & Machine Co., 163 Pleasant St., New Bedford, Mass.
National Twist Drill and Tool Co., Detroit
Standard Tool Co., Cleveland, Ohio
Union Twist Drill Co., Athol, Mass.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio

DRILL SPEEDERS
Buhr Machine Co., Ann Arbor, Mich.
Graham Mfg. Co., Providence, R. I.
Hoefer Mfg. Co., Freeport, Ill.

DRILL STANDS
Black & Decker Mfg. Co., 716 Pennsylvania Ave., Towson, Md.
James Clark Jr., Elec. Co., 600 Bergman St., Louisville, Ky.
Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y.
Cleveland Twist Drill Co., Ceveland, Ohio
Greenfield Tap and Die Corp., Greenfield, Mass.
Hisey-Wolf Machine Co., Cincinnati, Ohio
Huot Mfg. Co., St. Paul, Minn.
Morse Twist Drill and Machine Co., New Bedford, Mass.
National Twist Drill and Tool Co., Detroit, Mich.
Signal Electric Mfg. Co. Menominee, Mich.
Skilsaw Inc., 3310 Elston Ave., Chicago, Ill.
Standard Electrical Tool Co., 1940 W. 8th St., Cincinnati, Ohio
Standard Tool Co., Cleveland, Ohio
Union Twist Drill Co., Athol, Mass.
United State Electrical Tool Co., 2488 W. 6th St., Cincinnati, Ohio

DRILLING AND CENTERING MACHINES
(see Centering Machines)

DRILLING AND TAPPING HEADS, Multiple
Baker Bros., Inc., Toledo, Ohio
Barnes Drill Co., Rockford, Ill.
Bradford Machine Tool Co., 657 Evans St., Cincinnati, Ohio
Buhr Machine Tool Co., Ann Arbor, Mich.
Cross Gear and Machine Co., Detroit, Mich.
Defiance Machine Works, Defiance, Ohio
Errington Mechanical Laboratory, Stapleton, Staten Island, N. Y.
Ettco Tool Co., Brooklyn, N. Y.
Ex-Cell-O Aircraft and Tool Corp., Detroit
Foote-Burt Co., Cleveland, Ohio
Greenlee Bros. and Co., Rockford, Ill.
Hoefer Mfg. Co., Freeport, Ill.
Kingsbury Machine Tool Co., Keene, N. H.
Langelier Mfg. Co., Cranston, R. I.
Leland-Gifford Co., Worcester, Mass.
Moline Tool Co., Moline, Ill.
National Automatic Tool Co., Richmond, Ind.
Snyder Tool & Engrg. Co., 3400 E. Lafayette Ave., Detroit, Mich.

DRILLING AND TAPPING MACHINES, Dial Feed
Bodine Corp., 1720 Fairfield Ave., Bridgeport, Conn.

DRILLING AND TAPPING UNITS
Allen Co., Chas. G., Barre, Mass.
Avey Drilling Machine Co., Cincinnati, Ohio
Barnes Drill Co., Rockford, Ill.
Bradford Machine Tool Co., 657 Evans St., Cincinnati, Ohio
Bryant Machinery and Engrg. Co., 400 W. Madison St., Chicago, Ill.
Buhr Machine Tool Co., Ann Arbor, Mich.
Cincinnati Bickford Tool Co., Oakley, Cincinnati, Ohio
Ex-Cell-O Aircraft and Tool Corp., Detroit
Foote-Burt Co., Cleveland, Ohio
Fox Machine Co., 1410 W. Ganson St., Jackson, Mich.
Greenlee Bros. and Co., Rockford, Ill.
Hoefer Mfg. Co., Freeport, Ill.
Ingersoll Milling Machine Co., Rockford, Ill.
Kingsbury Machine Tool Co., Keene, N. H.
Langelier Mfg. Co., Cranston, R. I.
Moline Tool Co., Moline, Ill.
National Automatic Tool Co., Richmond, Ind.

DRILLING MACHINES, Automatic and Semi-Automatic
Allen Co., Chas. G., Barre, Mass.
Avey Drilling Machine Co., Cincinnati, Ohio
Baker Bros., Inc., Toledo, Ohio
Barnes Drill Co., Rockford, Ill.
Baush Machine Tool Co., 156 Wason Ave., Springfield, Mass.
Bodine Corp., 1720 Fairfield Ave., Bridgeport, Conn.
Bradford Machine Tool Co., 657 Evans St., Cincinnati, Ohio
Buhr Machine Tool Co., Anna Arbor, Mich.
Canedy-Otto Mfg. Co., Chicago Heights, Ill.
Cross Gear and Machine Co., Detroit, Mich.
Davenport Machine Tool Co., Rochester, N. Y.
Davis-Thompson Co., 6619 West Mitchell St., Milwaukee, Wisconsin
Defiance Machine Works, Defiance, Ohio
Dreses Machine Tool Co., Cincinnati, Ohio
Ex-Cell-O Aircraft and Tool Corp., Detroit
Foote Burt Co., Cleveland, Ohio
Fosdick Machine Tool Co., Cincinnati, Ohio
Fox Machine Co., 1410 W. Ganson St., Jackson, Mich.
Greenlee Bros. and Co., Rockford, Ill.
Ingersoll Milling Machine Co., Rockford, Ill.
Kingsbury Machine Tool Co., Keene, N. H.
Langelier Mfg. Co., Cranston, R. I.
Leland-Gifford Co., Worcester, Mass.
Moline Tool Co., Moline, Ill.
Morris Machine Tool Co., Court & Harriet Sts., Cincinnati, Ohio
National Automatic Tool Co., Richmond, Ind.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Rockford Drilling Machine Co., Rockford, Ill.
Snyder Tool & Engrg. Co., 3400 E. Lafayette Ave,, Detroit, Mich.

DRILLING MACHINES, Bench
Allen Co., Chas. G., Barre, Mass.
Atlas Press Co., 1849 N. Pitcher St., Kalamazoo, Mich.
Avey Drilling Machine Co., Cincinnati, Ohio
W. F. & John Barnes Co., Rockford, Ill.
Boice Crane Co., Toledo, Ohio
Buffalo Forge Co., Buffalo, N. Y.
Canedy-Otto Mfg Co., Chicago Heights, Ill.
Champion Blower & Forge Co., Harrisburg Ave., Lancaster, Pa.
Delta Mfg. Co., Vienna Ave., Milwaukee, Wis.
Dumore Co., Racine, Wis.
Foote-Burt Co., Cleveland, Ohio
Fosdick Machine Tool Co., Cincinnati, Ohio
Henry & Wright Mfg. Co., Hartford, Conn.
High Speed Hammer Co., Inc., Rochester, N. Y.
Langelier Mfg. Co., Cranston, R. I.
Leland-Gifford Co., Worcester, Mass.
Moline Tool Co., 102 20th St., Moline, Ill.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Jos. T. Ryerson & Son, Inc., 2558 W. 16th St., Chicago, Ill.
Skilsaw, Inc., Chicago, Ill.
Taylor and Fenn Co., Hartford, Conn.
Taylor Mfg. Corp., Milwaukee, Wis.

DRILLING MACHINES, Gang
Automatic Machine Co., Bridgeport, Conn.
Baker Bros. Inc., Toledo, Ohio
W. F. & John Barnes Co., Rockford, Ill.
Barnes Drill Co., Rockford, Ill.
Bryant Machinery and Engrg. Co., 400 W. Madison St., Chicago, Ill.
Cincinnati Bickford Tool Co., Oakley, Cincinnati, Ohio
Consolidated Machine Tool Co., Rochester, N. Y.
Delta Mfg. Co., Vienna Ave., Milwaukee, Wis.
Foote-Burt Co., Cleveland, Ohio
Fosdick Machine Tool Co., Cincinnati, Ohio
Fox Machine Co., 1410 W. Ganson St., Jackson, Mich.
Green Bay Barker Mach. & Tool Wks., Green Bay, Wis.
Henry & Wright Mfg. Co., Hartford, Conn.
High Speed Hammer Co., Inc., 313 Norton St., Rochester, N. Y.
Index Machinery Corp., 49 Central Ave., Cincinnati, Ohio.
Langelier Mfg. Co., Cranston, R. I.
Moline Tool Co., Moline, Ill.
National Automatic Tool Co., Richmond, Ind.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Snyder Tool & Engrg. Co., 3400 E. Lafayette Ave., Detroit, Mich.

DRILLING MACHINES, Heavy Duty
Allen Co., Chas. G. Barre, Mass.
Baker Bros. Inc., Toledo, Ohio
Barnes Drill Co., Rockford, Ill.
W. F. & John Barnes Co., Rockford, Ill.
Bryant Machinery and Engineering Co., 400 W. Madison St., Chicago, Ill.
Buffalo Forge Co., Buffalo, N. Y.
Cincinnati Bickford Tool Co., Oakley, Cincinnati, Ohio
Cleereman Machine Tool Co., Green Bay, Wis.
Consolidated Machine Tool Corp., Rochester, N. Y.
Davis & Thompson Co., 6619 West Mitchell St., Milwaukee, Wis.
Defiance Machine Works, Defiance, Ohio
Dreses Machine Tool Co., Cincinnati, Ohio
Foote-Burt Co., Cleveland, Ohio
Fosdick Machine Tool Co., Cincinnati, Ohio
General Machinery Corp. (Niles Tool Works Div.), Hamilton, Ohio
Ingersoll Milling Machine Co., Rockford, Ill.
Leland-Gifford Co, Worcester, Mass.
Moline Tool Co., Moline, Ill.
National Automatic Tool Co., Richmond, Ind.
Rockford Drilling Machine Co., Rockford, Ill.

DRILLING MACHINES, Horizontal
Allen Co. Chas. G., Barre, Mass.
Avey Drilling Machines Co., Cincinnati, Ohio
Baker Bros. Inc., Toledo, Ohio
Baush Machine & Tool Co., 156 Wason Ave., Sprigfield, Mass.
Bradford Machine Tool Co., 657 Evans St., Cincinnati, Ohio
Consolidated Machine Tool Corp., Rochester, N. Y.
Defiance Machine Works, Defiance, Ohio
Dreses Machine Tool Co., Cincinnati, Ohio
Foote-Burt Co., Cleveland, Ohio
Fosdick Machine Tool Co., Cincinnati, Ohio
Fox Machine Co., 1410 W. Ganson St., Jackson, Mich.
Frew Machine Co., Philadelphia, Pa.
General Machinery Corp. (Niles Tool Works Div.), Hamilton, Ohio
Giddings and Lewis Machine Tool Co., Fond du Lac, Wis.
Ingersoll Milling Machine Co., Rockford, Ill.
Kingsbury Machine Tool Co., Keene, N. H.
Langelier Mfg. Co., Cranston, R. I.
Moline Tool Co., Moline, Ill.
Murchey Machine and Tool Co., Detroit, Mich.
National Automatic Tool Co., Richmond, Ind.
Rockford Drilling Machine Co., Rockford, Ill.
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Sellers and Co. Inc., Wm., Philadelphia, Pa.
Universal Boring Machine Co., Hudson, Mass.

DRILLING MACHINES, Horizontal Duplex
Sundstrand Machine Tool Co., Rockford, Ill.

DRILLING MACHINES, Multi-Spindle
Allen Co., Chas. G., Barre, Mass.
Automatic Machine Co., Bridgeport, Conn.
Avey Drilling Machine Co., Cincinnati, Ohio
Baker Bros. Inc., Toledo, Ohio
Barnes Drill Co., Rockford, Ill.
Baush Machine Tool Co., 156 Wason Ave., Springfield, Mass.
Bodine Corp., 1720 Fairfield Ave., Bridgeport, Conn.
Bradford Machine Tool Co. 657 Evans St., Cincinnati, Ohio
Buffalo Forge Co., Buffalo, N. Y.
Buhr Machine Tool Co., Ann Arbor, Mich.
Canedy-Otto Mfg. Co., Chicago Heights, Ill.
Champion Blower & Forge Co., Harrisburg Ave., Lancaster, Pa.
Consolidated Machine Tool Corp., Rochester, N. Y.

DRILLING MACHINES, Multi-Spindle (Cont.)

Davis & Thompson Co., 6619 West Mitchell St., Milwaukee, Wis.
Defiance Machine Works, Defiance, Ohio
Delta Mfg. Co., 600 E. Vienna Ave., Milwaukee, Wis.
Ex-Cell-O Aircraft and Tool Corp., Detroit, Mich.
Foote-Burt Co., Cleveland, Ohio
Fosdick Machine Tool Co., Cincinnati, Ohio
Fox Machine Co., 1410 W. Ganson St., Jackson, Mich.
General Machinery Corp. (Niles Tool Works Div.), Hamliton, Ohio
Greenlee Bros. and Co., Rockford, Ill.
Henry & Wright Mfg. Co., Hartford, Conn.
High Speed Hammer Co., Inc., 313 Norton St., Rochester, N. Y.
Index Machinery Corp., 49 Central Ave., Cincinnati, Ohio
Hoefer Mfg. Co., Freeport, Ill.
Ingersoll Milling Machine Co., Rockford, Ill.
Kingsbury Machine Tool Co., Keene, N. H.
Langelier Mfg. Co., Cranston, R. I.
Leland-Gifford Co., Worcester, Mass.
Moline Tool Co., Moline, Ill.
National Automatic Tool Co., Richmond, Ind.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Rockford Drilling Machine Co., Rockford, Ill.
Taylor and Fenn Co., Hartford, Conn.

DRILLING MACHINES, Radial

American Tool Works Co., Cincinnati, Ohio
Bryant Machinery and Engineering Co., 400 W. Madison St., Chicago, Ill.
Canedy-Otto Mfg. Co., Chicago Heights, Ill.
Carlton Machine Tool Co., Cincinnati, Ohio
Cincinnati Bickford Tool Co., Oakley, Cincinnati, Ohio
Cleveland Punch and Shear Works Co., Cleveland, Ohio
Consolidated Machine Tool Corp, Rochester, N. Y.
Dreses Machine Tool Co., Cincinnati, Ohio
Fosdick Machine Tool Co., Cincinnati, Ohio
General Machinery Corp. (Niles Tool Works Div.), Hamilton, Ohio
Leland-Gifford Co., Worcester, Mass.
Morris Machine Tool Co., Court & Harriet Sts., Cincinnati, Ohio

DRILLING MACHINES, Sensitive

Allen Mfg. Co., Chas. G., Barre, Mass.
Atlas Press Co., 1819 N. Pitcher St., Kalamazoo, Mich.
Avey Drilling Machine Co., Cincinnati, Ohio
Boice Crane Co., Toledo, Ohio
Buffalo Forge Co., Buffalo, N. Y.
Canedy-Otto Mfg. Co., Chicago Heights, Ill.
Champion Blower & Forge Co., Harrisburg Ave., Lancaster, Pa.
James Clark Jr. Elec. Co., 600 Bergman St., Louisville, Ky.
Delta Mfg. Co., Vienna Ave., Milwaukee, Wis.
Dumore Co., Racine St., Racine, Wis.
Foote-Burt Co., Cleveland, Ohio
Fosdick Machine Tool Co., Cincinnati, Ohio
Henry & Wright Mfg. Co., Hartford, Conn.
High Speed Hammer Co., Inc., 313 Norton St., Rochester, N. Y.
Langelier Mfg. Co., Cranston, R. I.
Leland-Gifford Co., Worcester, Mass.
National Automatic Tool Co., Richmond, Ind.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Ryerson & Co., Jos. T., Chicago, Ill.
Stark Tool Co., Waltham, Mass.
Taylor and Fenn Co., Hartford, Conn.
Taylor Mfg. Corp., Milwaukee, Wis.

DRILLING MACHINES, Travelling Base

American Tool Works Co., Cincinnati, Ohio
Carlton Machine Tool Co., Cincinnati, Ohio
Cincinnati Bickford Tool Co., Oakley, Cincinnati, Ohio
Dreses Machine Tool Co., 3366 Beekman St., Cincinnati, Ohio
Fosdick Machine Tool Co., Blue Rock & Apple Sts., Cincinnati, Ohio

DRILLING MACHINES, Turret

Ingersoll Milling Machine Co., Rockford, Ill.
Kingsbury Machine Tool Co., Keene, N. H.

DRILLING MACHINES, Upright Multiple Spindle

Automatic Machine Co., Bridgeport, Conn.
Avey Drilling Machine Co., Cincinnati, Ohio
Baker Bros. Inc., Toledo, Ohio
Barnes Drill Co., Rockford, Ill.
W. F. & John Barnes Co., Rockford, Ill.
Baush Machine Tool Co., 15 Wason Ave., Springfield, Mass.
Bryant Machinery and Engineering Co., 400 W. Madison St., Chicago, Ill.
Buffalo Forge Co., Buffalo, N. Y.
Buhr Machine Tool Co., Ann Arbor, Mich.
Canedy-Otto Mfg. Co., Chicago Heights, Ill.
Champion Blower & Forge Co., Harrisburg Ave., Lancaster, Pa.
Consolidated Machine Tool Corp., Rochester.
Davis & Thompson Co., 6619 West Mitchell St., Milwaukee, Wis.
Defiance Machine Works, Defiance, Ohio
Ex-Cell-O Aircraft and Tool Corp., Detroit, Mich.
Foote-Burt Co., Cleveland, Ohio
Fosdick Machine Tool Co., Cincinnati, Ohio
Fox Machine Co., 1410 W. Ganson St., Jackson, Mich.
General Machinery Corp. (Niles Tool Works Div.), Hamilton, Ohio
Grant Mfg. and Machine Co., Bridgeport, Conn.
Greenlee Bros and Co., Rockford, Ill
High Speed Hammer Co., Inc., 313 Norton St., Rochester, N. Y.
Ingersoll Milling Machine Co., Rockford, Ill.
Langelier Mfg. Co., Cranston, R. I.
Moline Tool Co., Moline, Ill.
National Automatic Tool Co., Richmond, Ind.
Rockford Drilling Machine Co., Rockford, Ill.
Taylor and Fenn Co., Hartford, Conn.

DRILLING MACHINES, Vertical

Allen Co., Chas. G., Barre, Mass.
Baker Bros. Inc., Toledo, Ohio
Barnes Drill Co., Rockford, Ill.
W. F. & John Barnes Co., Rockford, Ill.
Baush Machine Tool Company, 156 Wason Ave., Springfield, Mass.
Boice Crane Co., Toledo, Ohio
Bradford Machine Tool Co., 657 Evans St., Cincinnati, Ohio
Bryant Machinery and Engrg. Co., 400 W. Madison St., Chicago, Ill.
Bullard Company, Bridgeport, Conn.
Canedy-Otto Mfg. Co., Chicago Heights, Ill.
Champion Blower and Forge Co., Harrisburg Ave., Lancaster, Pa.
Cincinnati Bickford Tool Co., Oakley, Cincinnati, Ohio
Cleereman Machine Tool Co., Green Bay, Wis.
Consolidated Machine Tool Corp., Rochester, N. Y.
Defiance Machine Works, Defiance, Ohio
Delta Mfg. Co., Vienna Ave., Milwaukee, Wis.
Foote-Burt Co., Cleveland, Ohio
Green Bay Barker Mach. & Tool Wks., Green Bay, Wis.
Fosdick Machine Tool Co., Cincinnati, Ohio
Henry and Wright Mfg. Co., Hartford, Conn.
High Speed Hammer Co., Inc., 313 Norton St., Rochester, N. Y.
Ingersoll Milling Machine Co., Rockford, Ill.
Kingsbury Machine Tool Co., Keene, N. H.
Langelier Mfg. Co., Cranston, R. I.
Leland-Gifford Co., 1025 Southbridge St., Worcester, Mass.
Moline Tool Co., 102-20th St., Moline, Ill.
National Automatic Tool Co., Richmond, Ind.
Taylor and Fenn Co., Hartford, Conn.

DRILLS, Bit Stock

Cleveland Twist Drill Co., Cleveland, Ohio
Crucible Steel Co. of America, New York
Greenfield Tap and Die Corp., Greenfield, Mass.
Morse Twist Drill and Machine Co., New Bedford, Mass.
National Twist Drill and Tool Co., Detroit
Standard Tool Co., Cleveland, Ohio
Timken Steel and Tubes, Inc., Canton, Ohio
Union Twist Drill Co., Athol, Mass.

DRILLS, Center

Carboloy Co., Inc., Detroit, Mich.
Cleveland Twist Drill Co., Cleveland, Ohio
Greenfield Tap and Die Corp., Greenfield, Mass.
Morse Twist Drill and Machine Co., New Bedford, Mass.
National Twist Drill and Tool Co., Detroit, Mich.
Pratt & Whitney Co., Div. Niles-Bement-Pond Co., 486 Capitol Ave.
Standard Tool Co., Cleveland, Ohio
Super Tool Company, 356 E. Congress St., Detroit, Mich.
Union Twist Drill Co., Athol, Mass.

DRILLS, Core

Carboloy Co., Inc., Detroit, Mich.
Eclipse Counterbore Co., Detroit, Mich.
Ex-Cell-O Aircraft & Tool Corp., 1200 Oakman Blvd., Detroit, Mich.
Gairing Tool Co., 629 Lafayette Blvd., Detroit
Gorham Tool Co., 14400 Woodrow Wilson Ave., Detroit, Mich.
Morse Twist Drill and Machine Co., New Bedford, Mass.
National Twist Drill and Tool Co., Detroit
Production Tool Co., Detroit, Mich.
Super Tool Company, 356 E. Congress St., Detroit, Mich.
Union Twist Drill Co., Athol, Mass.

DRILLS, Portable Electric

Black and Decker Mfg. Co., Towson, Md.
Buckeye Portable Tool Co., Dayton, Ohio
Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y.
James Clark, Jr., Elec. Co., 600 Bergman St., Louisville, Ky.
Hisey-Wolf Machine Co., Cincinnati, Ohio
Independent Pneumatic Tool Co., Chicago, Ill.
Rotor Air Tool Co., 5704 Carnegie Ave., Cleveland, Ohio
Jos. T. Ryerson & Son., Inc., 2558 W. 16th St., Chicago, Ill.
Savage Co., W. J., Knoxville, Tenn.
Signal Electric Mfg. Co., Menominee, Mich.
Skilsaw, Inc., 3310 Elston Ave., Chicago, Ill.
Speedway Mfg. Co., Cicero, Ill.
Standard Electrical Tool Co., Cincinnati, Ohio
Stanley Elec. Tool Div. of Stanley Works, New Britain, Conn.
Van Dorn Electric Tool Co., 716 Joppa Road, Towson, Md.

DRILLS, Pneumatic

Buckeye Portable Tool Co., Dayton, Ohio
Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y.
Helwig Mfg. Co., St. Paul, Minn.
Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill.
Ingersol-Rand Co., 11 Broadway, New York
Rotor Air Tool Co., 5704 Carnegie Ave., Cleveland, Ohio
Savage Co., W. J., Knoxville, Tenn.

DRILLS, Ratchet

Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Cleveland Twist Drill Co., Cleveland, Ohio
Greenfield Tap and Die Corp., Greenfield, Mass.
Morse Twist Drill and Machine Co., New Bedford, Mass.
National Twist Drill & Tool Co., 6522 Brush St., Detroit, Mich.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Standard Tool Co., Cleveland, Ohio
Union Twist Drill Co., Athol, Mass.

DRILLS, Twist and Flat

American Twist Drill & Tool Co., 14301 W. Chicago Blvd., Detroit, Mich.
Carboloy Co., Inc., 2987 E. Jefferson Ave., Detroit, Mich.
Cleveland Twist Drill Co., Cleveland, Ohio
Greenfield Tap and Die Corp., Greenfield, Mass.
Mass.
Morse Twist Drill and Machine Co., New Bedford, Mass.
National Twist Drill and Tool Co., Detroit, Mich.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Standard Tool Co., Cleveland, Ohio
Union Twist Drill Co., Athol, Mass.

DRIVES, Roller Chain (see Chain, Roller)

DRIVES, Silent Chain (see Chain Drives)

DRIVES, V-Belt

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Dayton Rubber Mfg. Co., Dayton, Ohio
Dodge Mfg. Corp. Mishawaka, Ind.
Gates Rubber Co., Denver, Colo.
B. F. Goodrich Co., 576 South Main St., Akron, Ohio

DRIVES, Variable Speed Motor (see Transmissions, Variable Speed)

DROP HAMMERS (see Hammers, Drop)

DUPLICATING MACHINES

George Gorton Machine Co., Racine, Wis.

DUST ARRESTORS

Abrasive Machine Tool Co., East Providence, R. I.
American Foundry Equipment Co., Mishawaka, Ind.
Chicago Rawhide Mfg. Co., Chicago, Ill.

DUST COLLECTORS

American Foundry Equipment Co., Mishawaka, Ind.

DYNAMIC BALANCING MACHINES (see Balancing Machines)

DYNAMOMETERS, Hydraulic

Taylor Mfg. Corp., Milwaukee, Wis.
Vickers, Inc., Detroit, Mich.

ELECTRIC HEATING ELEMENTS

American Foundry Equipment Co., Mishawaka, Ind.
Driver-Harris Co., Harrison, N. J.
Hevi-Duty Electric Co., 4212 W. Highland Blvd., Milwaukee, Wis.
Hoskins Mfg. Co., Detroit, Mich.
Harold E. Trent Co., 618 N. 54th St., Philadelphia, Pa.
Westinghouse Elec. and Mfg. Co., East Pittsburgh, Pa.

ELECTRIC LIGHTING

Fostoria Pressed Steel Corp., Fostoria, Ohio
General Electric Vapor Lamp Co., Hoboken, N. J.
Westinghouse Elec. and Mfg. Co., East Pittsburgh, Pa.

ELECTRICAL INSTRUMENTS

Bristol Co., Waterbury, Conn.
General Electric Co., Schenectady, N. Y.
Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia, Pa.
Western Electrical Inst. Corp., 614 Freylinghuysen Ave., Newark, N. J.

ELECTRICAL SUPPLIES

Arrow-Hart & Hegeman Elec. Co., 103 Hawthorne St., Hartford, Conn.
Benjamin Electric Mfg. Co., Des Plaines, Ill.
General Electric Co., Schenectady, N. Y.
Westinghouse Elec. and Mfg. Co., East Pittsburgh, Pa.

ELECTRODES, Welding

Air Reduction Sales Co., 60 E. 42nd St., New York, N. Y.
Aluminum Co. of America, 2107 Gulf Bldg., Pittsburgh, Pa.
American Brass Co., Waterbury, Conn.
Haynes-Stellite Co., Kokomo, Ind.
Lincoln Electric Co., Cleveland, Ohio

ELECTRODES, Welding, (Con.)
Linde Air Products Co., 30 E. 42nd St., New York, N. Y.
Jos. T. Ryerson & Son, Inc., 2558 W. 16th St., Chicago, Ill.
Welding Timer Mfg. Co., 251 Ogden St., Newark, N. J.
Westinghouse Elec. and Mfg. Co., East Pittsburgh, Pa.

ELEVATORS, Portable
Barrett-Cravens Co., 3255 W. 30th St., Chicago, Ill.

ELEVATING AND CONVEYING MACHINERY (see Conveyors)

EMERY WHEELS (see Grinding Wheels)

ENAMELING RACKS
Driver-Harris Co., Harrison, N. J.

ENAMELS
Bakelite Corp., Bound Brook, N. J.
Maas & Waldstein, Newark, N. J.

END MILLS (see Milling, Cutters)

ENGINES, Diesel
Baldwin-Southwark Corp., Paschall P. O. Station, Philadelphia, Pa.
Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y.
Fairbanks Morse and Co., Chicago
General Machinery Corp. (Niles Tool Works Div.), Hamilton Ohio
Ingersoll-Rand Co., 11 Broadway, N. Y.

ENGRAVING MACHINES
Electro-Graphic Graver Co., Factories Bldg., Toledo, O.
George Gorton Machine Co., 1103 13th St., Racine, Wis.
Marburg Bros., Inc., 90 West St., New York, N. Y.
Preis Engraving Machine Co., H. P., Newark, N. J.
Quality Merchandise Co., 2306 Lincolnwood Drive, Evanston, Ill.
Reed-Prentice Co., Worcester, Mass.

ESCUTCHEONS
Crowe Name Plate and Mfg. Co., Chicago

EXHAUST ATTACHMENTS
Abrasive Machine Tool Co., East Providence, R. I.
Standard Electrical Tool Co., Cincinnati, Ohio

EXTRUDED SHAPES, Aluminum
Aluminum Co. of America, 2107 Gulf Bldg., Pittsburgh, Pa.

EXTRACTORS, Broken Tap
Walton Co., Hartford, Conn.

EXTRUDED SHAPES, Copper, Brass
American Brass Co., Waterbury, Conn.
Revere Copper & Brass Inc., 230 Park Ave., New York, N. Y.

EYE BOLTS
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Gisholt Machine Co., Madison, Wis.
Stark Tool Co., Waltham, Mass.

FANS, Electric
Barber-Colman Company, Rockford, Ill.
Bendix Products Corp., South Bend, Ind.
Buffalo Forge Co., Buffalo, N. Y.
Champion Blower & Forge Co., Harrisburg Ave., Lancaster, Pa.
Emerson Electric Mfg. Co., 2001 Washington Ave., St. Louis, Mo.
General Electric Co., Schenectady, N. Y.
Savage Co., W. J., Knoxville, Tenn.
Signal Electric Mfg. Co., Menominee, Mich.
Westinghouse Elec. and Mfg. Co., East Pittsburgh, Pa.

FANS, Exhaust Ventilating (see Blowers and Fans)

FEED FINGERS (see Fingers, Feed)

FEEDS, Hydraulic for Machines
American Engineering Co., 2407 Aramingo Ave., Philadelphia, Pa.
Ex-Cell-o Aircraft and Tool Corp., Detroit
Hydraulic Press Mfg. Co., Mt. Gilead, Ohio
Logansport Machine Co., Lorgansport, Ind.

FELT, all kinds
Felters Co. Inc., South St., Boston, Mass.

FENCING
American Steel & Wire Co., Sub of U. S. Steel Co., Chicago, Ill.
Pittsburgh Steel Co., Union Trust Bldg., Pittsburgh, Pa.

FILES, Coil
E. C. Atkins and Co., 402 S. Illinois St., Indianapolis, Ind.
Nicholson File Co., Providence, R. I.

FILES, Swiss Pattern
American Swiss File & Tool Co., 410 Trumbull St., Elizabeth, N. J.
Nicholson File Co., Providence, R. I.

FILES AND RASPS
Atkins and Co., E. C., Indianapolis, Ind.
Delta File Works, Philadelphia, Pa.
Disston and Sons, Inc., Henry, Tacony, Philadelphia, Pa.
Ford Co., M. A., Davenport, Iowa
Grafton Bros., Grafton, Wis.
Grob Bros., Grafton, Wis.
Grobet File Corp. of America, 3 Park Place, New York, N. Y.
Index Machinery Corp., 49 Central Ave., Cincinnati, Ohio
Marburg Bros., Inc., 90 West St., New York
Nicholson File Co., Providence, R. I.
Oliver Instrument Co., Adrian, Mich.
Strand Co, N. A., 5001 N. Lincoln St., Chicago, Ill.

FILING MACHINES
Atkins and Co., E. C., Indianapolis, Ind.
Cochrane-Bly Co., Rochester, N. Y.
Continental Mach. Spec., Inc., Minneapolis, Minn.
Disston and Sons, Inc., Henry, Tacony, Philadelphia, Pa.
Grob Bros., Grafton, Wis.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
Index Machinery Corp., 49 Central Ave., Cincinnati, Ohio
Charles L. Jarvis Co., Gildersleeve, Conn.
Marburg Bros., Inc., 90 West St., New York
Oliver Instrument Co., Adrian, Mich.
Oliver Machinery Co., Grand Rapids, Mich.

FILTERS, Air
Amer. Air Filter Co., 333 Central Ave., Louisville, Ky.

FILTERS, for Cutting Compounds
Cuno Engineering Co., Meriden, Conn.
Fostoria Pressed Steel Corp., Fostoria, Ohio
Motor Improvements, Inc., 365 Frelinghuysen Ave., Newark, N. J.

FILTERS, for Fuel Oil
Cuno Engineering Co., Meriden, Conn.
Motor Improvements, Inc., 365 Frelinghuysen Ave., Newark, N. J.
North American Mfg. Co., 2910 E. 75 St., Cleveland, Ohio
T. Shriver & Co., 888 Hamilton St., Harrison, N. J.

FILTERS, for Lubricants
Cuno Engineering Co., Meriden, Conn.
Felters Co., Inc., South St., Boston, Mass.
Motor Improvements, Inc., 365 Frelinghuysen Ave., Newark, N. J.
T. Shriver & Co., 888 Hamilton St., Harrison, N. J.

FINGERS, Feed
Eastern Machine Screw Corp., New Haven, Conn.
Davenport Machine Tool Co., Inc., 167 Ames St., Rochester, N. Y.
Hardinge Brothers, Inc., Elmira, N. Y.
Mitts and Merrill, Saginaw, Mich.
Morrison Machine Tool Co., Court & Harriet Sts., Cincinnati, Ohio
Rivett Lathe and Grinder Co., Inc., Brighton, Boston, Mass.

FITTINGS, Wire Rope
American Steel and Wire Co., Chicago, Ill.
Williams & Co., J. H., 75 Spring St., New York, N. Y.

FLAME CUTTING MACHINES
Air Reduction Sales Co., 60 E. 42nd St., New York, N. Y.
Linde Air Products Co., 30 E. 42nd St., New York, N. Y.
Ryerson and Co., Inc., Jos. T., 16th and Rockwell Sts, Chicago, Ill.

FLANGED UNIONS
Aluminum Company of America, Pittsburgh, Pa.
Dart Mfg. Co. E. M., Providence, R. I.
Elmes Engineering Works, Chas. F., 1001 Fulton St., Chicago, Ill.
Hydraulic Press Mfg. Co., Mt. Gilead, Ohio
Watson-Stillman Co., Roselle, N. J.

FLASKS, Foundry
American Foundry Equipment Co., Mishawaka, Ind.

FLEXIBLE COUPLINGS (See Couplings, Flexible)

FLEXIBLE-SHAFT EQUIPMENT
Dumore Company, Racine, Wis.
Errington Mechanical Laboratory, Stapleton, Staten Island, N. Y.
Haskins Co., R. G., 4630 West Fulton St., Chicago, Ill.
Charles L. Jarvis Co., Gildersleeve, Conn.
Mall Tool Company, 7740 S. Chicago Ave., Chicago, Ill.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Strand Co., N. A., 5001 N. Lincoln St., Chicago, Ill.
Swartz & White Mfg. Co., 215 Washington St., Binghamton, N. Y.
White Dental Mfg. Co., S. S. Philadelphia

FLOOD LIGHTS
Benjamin Elec. Mfg., Des Plaines, Ill.
Westinghouse Elec. and Mfg. Co., East Pittsburgh, Pa.

FLOOD LIGHTS, Acetylene
Linde Air Products Co., 30 E. 42nd St., New York, N. Y.

FLOOR STANDS, Bar Type
Campbell, Andrew C., (Division Am. Chain & Cable Co.), Bridgeport, Conn.

FOOT PRESSES (see Presses, Foot) Forges
American Gas Furnace Co., Elizabeth, N. J.
Buffalo Forge Co., Buffalo, N. Y.
Champion Blower and Forge Co., Harrisburg Ave., Lancaster, N. Y.
Charles A. Hones, Inc., 121 S. Rand Ave., Baldwin, N. Y.

FORGING MACHINERY
Acme Machinery Co., Cleveland, Ohio
Ajax Mfg. Co., Cleveland, Ohio (Euclid Branch P. O.)
Baldwin-Southwark Corp., Paschall P. O. Station, Philadelphia, Pa.
Chambersburg Engineering Co., Chambersburg, Pa.
Erie Foundry Co., Erie, Pa.
Hydraulic Press Mfg. Co., Mt. Gilead, Ohio
E. J. Manville Co., Waterbury, Conn.
National Machinery Co., Tiffin, Ohio

FORGING ROLLS
Ajax Mfg. Co., Cleveland, Ohio (Euclid Branch P. O.)
Williams, White & Co., Moline, Ill.

FORGINGS
Bonney Forge & Tool Works, Allentown, Pa.
Carnegie-Illinois Steel Corp., Pittsburg, Pa.
Columbia Tool Steel Co., 425 E. 14th St., Chicago, Ill.
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.
Heppenstall Co., 4620 Hatfield St., Pittsburg, Pa.
Latrobe Electrical Steel Co., 2626 Ligonier St., Latrobe, Pa.
Lempco Products, Inc., Dunham Road, Bedford, Ohio.
Ludlum Steel Co., Watervliet, N. Y.
Prosser and Sons, Thos., 15 Gold St., New York, N. Y.
Revere Copper & Brass, Inc., 230 Park Ave., New York, N. Y.

FORGINGS, Aluminum
Aluminum Co. of America, Pittsburgh, Pa.

FORGINGS, Copper, Brass and Bronze
American Brass Co., Waterbury, Conn.
Revere Copper and Brass Corp., 230 Park Ave., New York, N. Y.

FORGINGS, Hollow Bored
American Hollow Boring Co., 19th and Raspberry Sts., Erie, Pa.
Heppenstall Co., 4620 Hatfield St., Pittsburgh, Pa.

FORMING AND BENDING MACHINES
Ajax Manufacturing Co., Euclid Branch P. O., Cleveland, Ohio
Chambersburg Engineering Co., Chambersburg, Pa.
Cincinnati Shaper Co., Cincinnati, Ohio
Cleveland Punch and Shear Works Co., Cleveland, Ohio
Elmes Engrg. Works, Chas. F., 1001 Fulton St., Chicago, Ill.
Farrel-Birmingham Co. Inc., Ansonia, Conn.
Hannifin Mfg. Co., 621 S. Kolmar Ave., Chicago, Ill.
Hydraulic Press Mfg. Co. Mt. Gilead, Ohio
Marburg Bros. Inc., 90 West St., New York, N. Y.
Niagara Machine and Tool Works, Buffalo, N. Y.
Peck, Stow & Wilcox Co., Southington, Conn.
Ryerson and Co. Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Schatz Mfg. Co., Poughkeepsie, N. Y.
United Engrg. & Fdry. Co., Pittsburgh, Pa.
Watson-Stillman Co., Roselle, N. J.
Whitney Metal Tool Co., Rockford, Ill.
Williams, White & Co., Moline, Ill.

FOUNDRY FLASKS (see Flasks, Foundry)

FOUNDRY HANDLING EQUIPMENT
All Steel Welded Truck Corp., 1145 Railroad Ave., Rockford, Ill.
American Engineering Co., Philadelphia, Pa.
American Foundry Equipment Co., 555 S. Byrkit St., Mishawaka, Ind.
American Mono-Rail Co., 13113 Athens Ave., Cleveland, Ohio
Baker-Raulang Co., Cleveland, Ohio
Cleveland Crane and Engineering Co., Wickliffe, Ohio
Elwell-Parker Electric Co., 4511 St. Clair Ave., Cleveland, Ohio

Foundry Handling Eqhipment—(Cont.)
Osborne Mfg. Co., 5401 Hamilton Ave., Cleveland, Ohio
Tabor Mfg. Co., 6225 Tacony St., Philadelphia, Pa.
Powell Pressed Steel Co., Hubbard, Ohio
Yale and Towne Mfg. Co., Philadelphia Div., Philadelphia, Pa.

FOUNDRY JACKETS (see Jackets, Foundry)

FOUNDRY SAND AND MOLD HANDLING EQUIPMENT
American Foundry Equipment Co., 555 S. Byrkit St., Mishawaka, Ind.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Osborne Mfg. Co., 5401 Hamilton Ave., Cleveland, Ohio

FRICTION PULLEYS
Brown and Sharpe Mfg. Co., Providence, R. I.
Continental Diamond Fibre Co., Newark, Del.
Hanson Clutch & Machinery Co., Tiffin, Ohio
Hendey Machine Co., Torrington, Conn.
Carlyle Johnson Machine Co., 52 Main St., Manchester, Conn.
Power Transmission Council, 74 State St., Boston, Mass.

FUEL OIL
Gulf Refining Co., Pittsburgh, Pa.
Motor Improvements, Inc., 365 Frelinghuysen Ave., Newark, N. J.
Socony-Vacuum Oil Co., New York, N. Y.
Standard Oil Co. of Indianna, Chicago, Ill.
Standard Tool Co., Cleveland, Ohio
Texas Co., The, New York, N. Y.
Tidewater Associated Oil Co., 17 Battery Pl., New York, N. Y.

FURNACES, Heat Treating, Tempering and Annealing
American Gas Furnace Co., Elizabeth, N. J.
Baker and Co., Inc., 54 Austin St., Newark, N. J.
Electric Furnace Co., W. Wilson St., Salem, Ohio
Firth-Stirling Steel Co., McKeesport, Pa.
General Electric Co., Schenectady, N. Y.
Heavi-Duty Electric Co., 4212 W. Highland Blvd., Milwaukee, Wis.
Holcroft & Co., Detroit, Mich.
Charles A. Hones, Inc., 121 S. Rand Ave., Baldwin, N. Y.
Hoskins Mfg. Co., Detroit, Mich.
Ingersoll-Rand Co., 11 Broadway, New York, N. Y.
C. M. Kemp, Baltimore, Md.
Leeds and Northrup Co., Philadelphia, Pa.
Lindberg Engineering Co., 221 N. Laflin St., Chicago, Ill.
W. S. Rockwell Co., 50 Church St., New York City
Sentry Co., Foxboro, Mass.
Stark Tool Co., Waltham, Mass.
Strong, Carlisle and Hammond Co., Cleveland, Ohio
Surface Combustion Corp., Toledo, Ohio
Harold E. Trent Co., 618 N. 54th St., Philadelphia, Pa.
Westinghouse Electric and Mfg. Co., East Pittsburgh, Pa.

FURNITURE, Machine Shop
General Fireproofing Co., Youngstown, Ohio
Standard Pressed Steel Co., Jenkintown, Pa.
Western Tool and Mfg. Co., Springfield, Ohio
Whistler and Sons, S. B. Inc., Buffalo, N. Y.

FUSES, Electric
General Electric Co., Schenectady, N. Y.
Jefferson Electric Co., Bellwood, Ill.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

GAGES, Caliper
Brown and Sharpe Mfg. Co., Providence, R. I.
L. S. Starrett Co., Crescent St., Athol, Mass.
J. H. Williams Co., 75 Spring St., N. Y.

GAGES, Comparator
Ames Co., B. C., Waltham, Mass.
Federal Products Corp., Providence, R. I.
Index Machinery Corp., 49 Central Ave., Cincinnati, Ohio
Marburg Bros., Inc., 90 West St., New York, N. Y.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Scherr Co., Inc., Geo., 128 Lafayette St., New York, N. Y.
Sheffield Gage Corp, Dayton, Ohio
Standard Gage Co., Inc., Poughkeepsie, N. Y.
Starrett Co., the L. S., Athol, Mass.
Swedish Gage Co. of America, 7310 Woodward Ave., Detroit, Mich.
Van Keuren Company, The, Watertown, Mass.

GAGES, Depth
Brown and Sharpe Mfg. Co., Providence, R. I.
Federal Products Corp., Providence, R. I.
Lufkin Rule Co., Saginaw, Mich.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Scherr Co., Inc., Geo., 128 Lafayette St., New York, N. Y.
Sheffield Gage Corp., Dayton, Ohio
Standard Gage Co., Inc., Poughkeepsie, N. Y.
Starrett Co., The L. S., Athol, Mass.
Taft-Peirce Mfg. Co., Woonsocket, R. I.
Vinco Tool Co., Detroit, Mich.

GAGES, Dial
Federal Products Inc., Providence, R. I.
Randall & Stickney, Waltham, Mass.

GAGES, Plug and Ring, Cemented Carbide
Carboloy Co., Inc., Detroit, Mich.
Sheffield Gage Corp., Dayton, Ohio
Super Tool Company, 356 E. Congress St., Detroit, Mich.

GAGES, Profile
Pratt & Whitney Div. Niles-Bement-Pond, 436 Capitol Ave., Hartford, Conn.
Sheffield Gage Corp., Dayton, Ohio
Standard Gage Co., Inc., Poughkeepsie, N. Y.
Taft-Peirce Mfg. Co., Woonsocket, R. I.
Van Keuren Co., Watertown, Mass.
Vinco Tool Co., Detroit, Mich.

GAGES, Recording
Bristol Co., Waterbury, Conn.
Brown Instrument Co. (A Div. of Minneapolis-Honeywell Reg. Co.), 405 Wayne Ave., Philadelphia, Pa.
Federal Products Corp., Providence, R. I.
Leeds and Northrup Co., Philadelphia, Pa.
C. J. Tagliabue Mfg. Co., Park & Nostrand Ave., Brooklyn, N. Y.
Taylor & Fenn Co., 94 Arch St., Hartford, Conn.

GAGES, Snap Plug, and Cylindrical
Brown and Sharpe Mfg. Co., Providence, R. I.
Carboloy Co., Inc., 2987 E. Jefferson Ave., Detroit, Mich.
Federal Products Corp., Providence, R. I.
Greenfield Tap and Die Corp., Greenfield, Mass.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
George Scherr Co., Inc., 128 Lafayette St., New York City
Sheffield Gage Corp., Dayton, Ohio
Standard Gage Co., Inc., Poughkeepsie, N. Y.
Swedish Gage Co., of America, 7310 Woodward Ave., Detroit, Mich.
Taft-Peirce Mfg. Co., Woonsocket, R. I.
Van Keuren Co., Watertown, Mass.
Vinco Tool Co., Detroit, Mich.
J. H. Williams, Co., 75 Spring St., N. Y.

GAGES, Thickness
Ames Co., B. C. Waltham, Mass.
Brown and Sharpe Mfg. Co., Providence, R. I.
Ford Motor Co., Johansson Div., 3674 Schaefer Road, Dearborn, Mich.
Federal Products Corp., Providence, R. I.
Lufkin Rule Co., Saginaw, Mich.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Randall and Stickney Co., Waltham, Mass.
George Scherr Co., Inc., 128 Lafayette St., New York City
Sheffield Gage Co., Dayton, Ohio
Standard Gage Co., Poughkeepsie, N. Y.
Taft-Peirce Mfg. Co., Woonsocket, R. I.
Van Keuren Co., Watertown, Mass.
Vinco Tool Co., Detroit, Mich.

GAGES, Thread
John Bath and Co., Inc., Worcester, Mass.
Brown and Sharpe Mfg. Co., Providence, R. I.
Colonial Broach Company, Detroit, Mich.
Detroit Tap and Tool Co., Detroit, Mich.
Federal Products Corp., Providence, R. I.
Greenfield Tap and Die Corp., Greenfield, Mass.
Hanson-Whitney Machine Co., Hartford, Conn.
Lufkin Rule Co., Saginaw, Mich.
Michigan Tool Co., Detroit, Mich.
Pratt & Whitney Div., Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
George Scherr Co., Inc., 128 Lafayette St., New York City
Sheffield Gage Corp., Dayton, Ohio
Starrett Co., The L. S., Athol, Mass.
Taft-Peirce Mfg. Co., Woonsocket, R. I.

GAGES, Wire
E. C. Atkins & Co., 402 S. Illinois St., Indianapolis, Ind.
Disston and Sons, Inc., Henry Tacony, Philadelphia, Pa.
Federal Products Corp., 1144 Eddy St., Providence, R. I.
L. S. Starrett Co., Crescent St., Athol, Mass.

GASKETS
Colt's Patent Fire Arms Mfg. Co., 17 Van Dyke Ave., Hartford, Conn.
Continental Diamond Fibre Co., Newark, Del.
Felters Co. Inc., South St., Boston, Mass.
Gates Rubber Co., Denver, Colo.
B. F. Goodrich Co., 576 South Main St., Akron, Ohio
Graton and Knight Co., Worcester, Mass.

GASOLINE
Gulf Refining Co., Pittsburgh, Pa.
Socony-Vacuum Oil Co., of New York, N. Y.
Standard Oil Co., of Indiana, Chicago, Ill.
Sun Oil Company, Philadelphia, Pa.
Texas Company, The New York, N. Y.
Tidewater Associated Oil Co., 17 Battery Place, New York

GATES, Fence
American Steel & Wire Co., Sub. of U. S. Steel Co., Chicago, Ill.
Pittsburgh Steel Co., Union Trust Bldg, Pittsburgh, Pa.

GEAR BLANKS, Bronze
American Brass Co., Waterbury, Conn.
Ampco Metal Co., Milwaukee, Wis.
Earle Gear & Mach. Co., 4707 Stenton, Ave., Philadelphia, Pa.
Revere Copper & Brass, Inc., 230 Park Ave., New York, N. Y.

GEAR BLANKS, Composition
Bakelite Corp., Bound Brook, N. J.
Bilgram Gear and Machine Works, Philadelphia, Pa.
Cincinnati Gear Company, Cincinnati, Ohio
Continental Diamond Fibre Co., Newark, Delaware
Earle Gear & Mach. Co., 4707 Stenton Ave., Philadelphia, Pa.
Formica Insulation Co., 4614 Spring Grove Ave., Cincinnati, Ohio
Ganschow Gear Co., 1013 Washington Blvd., Chicago, Ill.
Grant Gear Works, Inc., South Boston, Mass
Savage Co., W. J. Knoxville, Tenn.
Synthane Corp., Oaks, Pa.
Westinghouse Elec and Mfg. Co., East Pittsburgh, Pa.

GEAR BLANKS, Laminated Steel
Ajax Electric Co., Frankford Ave. and Allen St., Phiadelphia, Pa.
Bilgram Gear and Machine Works, Philadelphia, Pa.
Earle Gear & Mach., Co., 4707 Stenton Ave., Philadelphia, Pa.
Ganschow Gear Co., 1013 Washington Blvd., Chicago, Ill.
Grant Gear Works, Inc., South Boston, Mass.
Waldron Corp., John, New Brunswick, N. J.

GEAR BURNISHING MACHINES
Cimatool Co., Dayton, Ohio
Colonial Broach Co., Detroit, Mich.
Detroit Tap and Tool Co., Detroit, Mich.
Fellows Gear Shaper Co., Springfield, Vt.
Gleason Works, Rochester, N. Y.
Michigan Tool Co., Detroit, Mich.
National Broach Machine Co., 11455 Shoemaker Ave., Detroit, Mich.

GEAR CUTTING
Bilgram Gear & Machine Works, 1223 Spring Garden St., Philadelphia, Pa.

GEAR CUTTING MACHINES
Adams Co., Dubuque, Iowa
Barber-Colman Co., Rockford, Ill.
Bilgram Gear and Machine Works, Philadelphia, Pa.
Brown and Sharpe Mfg. Co., Providence, R. I.
Cleveland Hobbing Mach. Co., Cleveland, Ohio
Cross Gear and Machine Co., Detroit, Mich.
R. M. Clough, Meriden, Conn.
Detroit Tap and Tool Co., Detroit, Mich.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Fellows Gear Shaper Co., Springfield, Vt.
General Machinery Corp. (Niles Tool Works Div.), Hamilton, Ohio
Gleason Works, Rochester, N. Y.
Gould and Eberhardt, Irvington, N. J.
Lees-Bradner Co., Cleveland, Ohio
Michigan Tool Co., Detroit, Mich.
National Broach & Machine Co., 11455 Shoemaker Ave., Detroit, Mich.
Producto Machine Co., Bridgeport, Conn.
Scherr Co., Inc., Geo., 128 Lafayette St., New York, N. Y.
Waltham Machine Works, Waltham, Mass.

GEAR CUTTING MACHINES, Bevel (Generator and Template Planer)
Bilgram Gear and Machine Works, Philadelphia, Pa.
Colonial Broach Co., Detroit, Mich.
General Machinery Corp. (Niles Tool Works Div.), Hamilton, Ohio
Gleason Works, Rochester, N. Y.
National Broach & Machine Co., 11455 Shoemaker Ave., Detroit, Mich.
Scherr Co., Geo., 128 Lafayette St., New York, N. Y.

GEAR CUTTING MACHINES, Bevel and Spur (Rotary Cutter)
Brown and Sharpe Mfg. Co., Providence, R. I.
Gleason Works, Rochester, N. Y.
Gould and Eberhardt, Irvington, N. J.
National Broach & Machine Co., 11455 Shoemaker Ave., Detroit, Mich.
Producto Machine Co., Bridgeport, Conn.

GEAR CUTTING MACHINES, Helical and Spur (Hob)
Adams Co., Dubuque, Iowa
Barber-Colman Co., Rockford, Ill.
Brown and Sharpe Mfg. Co., Providence, R. I.
Gould and Eberhardt, Irvington, N. J.
Lees-Bradner Co., Cleveland, Ohio
National Broach & Machine Co., 11455 Shoemaker Ave., Detroit, Mich.
Scherr Co., Inc., Geo., 128 Lafayette St., New York, N. Y.

GEAR CUTTING MACHINES, Helical and Spur (Shaper or Planer Type)
Cleveland Hobbing Mach. Co., Cleveland, Ohio
Cross Gear and Machine Co., Detroit, Mich.
Farrel-Birmingham Co., Inc., 355 Vulcan St., Buffalo, N. Y.
Fellows Gear Shaper Co., Springfield, Vt.
National Broach & Machine Co., 11455 Shoemaker Ave., Detroit, Mich.

GEAR CUTTING MACHINES, Spiral, Bevel, and Hypoid-Gear Generating

Gleason Works, Rochester, N. Y.

GEAR CUTTING MACHINES, Worm and Worm Wheel (Hob)

Adams Co., Dubuque, Iowa
Barber-Colman Co., Rockford, Ill.
Cleveland Hobbing Machine Co., E. 152nd St., Cleveland, Ohio
Gould and Eberhardt, Irvington, N. J.
Lees-Bradner Co., Cleveland, Ohio
Michigan Tool Co., Detroit, Mich.
Producto Machine Co., Bridgeport, Conn.
Scherr Co., Inc., Geo., 128 Lafayette St., New York, N. Y.

GEAR LAPPING MACHINES

American Tool Works Co., Cincinnati, Ohio
Colonial Broach Co., Detroit, Mich.
Detroit Tap and Tool Co., Detroit, Mich.
Farrel-Birmingham Co., Inc., 355 Vulcan St., Buffalo, N. Y.
Fellows Gear Shaper Co., Springfield, Vt.
Gleason Works, Rochester, N. Y.
Hutto Division of Carborundum Co., Detroit, Mich.
Marburg Bros., Inc., 90 West St., New York
Michigan Tool Co., Detroit, Mich.
National Broach & Machine Co., 11455 Shoemaker Ave., Detroit, Mich.

GEAR MEASURING MACHINES

Colonial Broach Co., Detroit, Mich.
Detroit Tap and Tool Co., Detroit, Mich.
Farrel-Birmingham Co., Inc., 355 Vulcan St., Buffalo, N. Y.
Fellows Gear Shaper Co., Springfield, Vt.
Illinois Tool Works, 2501 N. Keeler Ave, Chicago, Ill.
Lees-Bradner Co., Cleveland, Ohio
Michigan Tool Co., Detroit, Mich.
National Broach & Machine Co., 11455 Shoemaker Ave., Detroit, Mich.
Pratt & Whitney Div. Niles-Bement-Pond Co., 43 Capitol Ave., Hartford, Conn.
Scherr Co., Inc., Geo., 128 Lafayette St., New York, N. Y.

GEAR MOTORS (see Speed Reducers, Motorized)

GEAR TEMPERING MACHINES

Gleason Works, Rochester, N. Y.

GEAR TESTING MACHINES

Brown and Sharpe Mfg. Co., Providence, R. I.
Colonial Broach Co., Detroit, Mich.
Detroit Tap and Tool Co., Detroit, Mich.
Farrel-Birmingham Co., Inc., 355 Vulcan St., Buffalo, N. Y.
Fellows Gear Shaper Co., Springfield, Vt.
Gleason Works, Rochester, N. Y.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
Lees-Bradner Co., Cleveland, Ohio
Michigan Tool Co., Detroit, Mich.
Morse Twist Drill & Machine Co., 163 Pleasant St., New Bedford, Mass.
National Broach & Machine Co., 11455 Shoemaker Ave., Detroit, Mich.
Scherr Co., Inc., Geo., 128 Lafayette St., New York, N. Y.

GEAR TOOTH ROUNDING MACHINES

Cimatool Co., Dayton, Ohio
Consolidated Machine Tool Corp., Rochester, N. Y.
Cross Gear and Machine Co., Detroit, Mich.
W. C. Lipe, Inc., 208 S. Geddes St., Syracuse, N. Y.

GEARS

Bilgram Gear & Machine Works, 1223 Spring Garden St., Philadelphia, Pa.

GEARS, Burnishing

Fellows Gear Shaper Co., Springfield, Vt.
Illinois Tool Works, 2501 Keeler Ave., N., Chicago, Ill.

GEARS, Cast

Baush Machine Tool Co., 156 Wason Ave., Springfield, Mass.
Chicago Rawhide Mfg. Co., Chicago, Ill.
Clarksville Foundry & Machine Works, Commerce & Spring Sts., Clarksville, Tenn.
Dodge Mfg. Corp., Mishawaka, Ind.
Earle Gear & Machine Co., Philadelphia
Farrel-Birmingham Co. Inc., Ansonia, Conn.
General Electric Co., Schenectady, N. Y.
Gerdes & Co., Inc., 36 Church St., New York
Grant Gear Works Inc., South Boston, Mass
Link-Belt Co., 2410 W. 18 St., Chicago, Ill.
Massachusetts Gear and Tool Co., Woburn, Mass.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Philadelphia Gear Works Inc., Philadelphia
Savage Co., W. J., Knoxville, Tenn.

GEARS, Cut

Adams Co., Dubuque, Iowa
Baush Machine Tool Co., 156 Wason Ave., Springfield, Mass.
Bilgram Gear and Machine Works, Philadelphia, Pa.
Boston Gear Works, Inc., North Quincy, Mass.
Brown and Sharpe Mfg. Co., Providence, R. I.
Chicago Rawhide Mfg. Co., Chicago, Ill.
Cincinnati Gear Co., Cincinnati, Ohio
Cincinnati Lathe and Tool Co., Oakley, Cincinnati, Ohio
Clarksville Foundry & Machine Works, Commerce & Spring Sts., Clarksville, Tenn.
Chas. E. Crofoot Gear Corp., South Easton, Mass.
DeLaval Steam Turbine Co., Trenton, N. J.
Earle Gear and Machine Co., Philadelphia, Pa.
Farrel-Birmingham Co., Inc., 355 Vulcan St., Buffalo, N. Y.
Foote Gear Works, Cicero, Ill.
Ganschow Gear Co., 1013 Washington Blvd., Chicago, Ill.
Gear Specialties, Inc., 2635 Canton St., Chicago, Ill.
General Machinery Corp. (Niles Tool Works Div.), Hamilton, Ohio
Gerdes & Co., Inc., 36 Church St., New York
Gould and Eberhardt, Irvington, N. J.
Grant Gear Works, Inc., South Boston, Mass.
Hartford Special Machinery Co., Hartford, Conn.
Horsburgh and Scott Co., Cleveland, Ohio
James Mfg. Co., D. O., Chicago, Ill.
Carlyle Johnson Machine Co., Manchester, Conn.
Lempco Products Inc., Dunham Road, Bedford, Ohio
Link-Belt Co., 2410 W. 18th St., Chicago
Massachusetts Gear and Tool Co., Woburn, Mass.
Mechanical Specialities, Inc., 2635 Canton St., Chicago, Ill.
Meisel Press Mfg. Co., Boston, Mass.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
National Erie Corp., Erie, Pa.
Ohio Gear Co., 1333 E. 179th St., Cleveland, Ohio
Perkins Machine and Gear Co., Springfield, Mass.
Philadelphia Gear Works, Inc., Philadelphia
Savage Co., W. J., Knoxville, Tenn.
Sier-Bath Gear Co., New York, N. Y.
Slaysman and Co., 813 E. Pratt St., Baltimore, Md.
Winfield H. Smith, Inc., Springville, Erie County, N. Y.
Stahl Gear and Machine Co., Cleveland, Ohio
Vinco Tool Co., Detroit, Mich.
Westinghouse Elec. and Mfg. Co., East Pittsburg, Pa.

GEARS, Laminated Steel

Bilgram Gear and Machine Works, Philadelphia, Pa.
Chicago Rawhide Mfg. Co., Chicago, Ill.
Earle Gear & Machine Co., Philadelphia
Farrel-Birmingham Co., Inc., 355 Vulcan St., Buffalo, N. Y.
Foote Gear Works, Inc., 1301 South Cicero Ave., Cicero, Ill.
Ganschow Gear Co., 1013 W. Washington Blvd., Chicago, Ill.
Gear Specialties, Inc., 2635 Canton St., Chicago, Ill.
Gerdes & Co., Inc., 36 Church St., New York
Grant Gear Works, Inc., South Boston, Mass.
Mechanical Specialties, Inc., 2335 Canton St., Chicago, Ill.
Meisel Press Mfg. Co., Boston, Mass.
Slaysman & Co., 813 E. Pratt St., Baltimore, Md.
Stahl Gear and Machine Co., Cleveland, Ohio

GEARS, Master

Baush Machine Tool Co., 156 Wason Ave., Springfield, Mass.
Earle Gear & Mach. Co., 4707 Stenton Ave., Philadelphia, Pa.
Fellows Gear Shaper Co., Springfield, Vt.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Vinco Tool Co., 7350 Central Ave., Detroit

GEARS, Non-Metallic

Adams Co., Dubuque, Iowa
Bakelite Corporation, Bound Brook, N. J.
Bilgram Gear and Machine Works, Philadelphia, Pa.
Boston Gear Works Inc., North Quincy, Mass.
Chicago Rawhide Mfg. Co., Chicago, Ill.
Cincinnati Gear Co., Cincinnati, Ohio
Clarksville Foundry & Machine Works, Commerce & Spring Sts., Clarksville, Tenn.
Continental Diamond Fibre Co., Newark, Del.
Chas. E. Crofoot Gear Corp., South Easton, Mass.
Earle Gear & Machine Co., Philadelphia
Farrel-Birmingham Co., Inc., 355 Vulcan St., Buffalo, N. Y.
Foote Gear Works, Inc., 1301 South Ciero Avenue, Cicero, Ill.
Formica Insulation Co., Cincinnati, Ohio
Ganschow Gear Co., 1013 Washington Blvd., Chicago, Ill.
Gear Specialties Inc., 2635 Canton St., Chicago, Ill.
Gerdes and Co., 36 Church St., New York City
Grant Gear Works Inc., South Boston, Mass.
Hartford Special Machinery Co., Hartford, Conn.
Horsburgh and Scott Co., Cleveland, Ohio
James Mfg. Co., D. O., Chicago, Ill.
Massachusetts Gear and Tool Co., Woburn, Mass.
Mechanical Specialties Inc., 2635 Canton St., Chicago, Ill.
Meisel Press Mfg. Co., Boston, Mass.
Ohio Gear Co., 1333 E. 179th St., Cleveland
Perkins Machine and Gear Co., Springfield Mass.
Philadelphia Gear Works Inc., Philadelphi:
Savage Co., W. J., Knoxville, Tenn.
Slaysman and Co., 813 E. Pratt St., Baltimore, Md.
Winfield H. Smith, Inc., Springville, Erie County, N. Y.
Stahl Gear and Machine Co., The, Cleveland, Ohio
Synthane Corp., Oaks, Pa.
Westinghouse Elec. and Mfg. Co., East Pittsburgh, Pa.

GENERATORS, Carbon, Acetylene

Air Reduction Sales Co., 60 E. 42nd St., New York, N. Y.
Linde Air Products Co., 30 E. 42 St., N. Y. C.

GENERATORS, Electric

Allis-Chalmers Mfg. Co. Milwaukee, Wis.
Century Electric Co., 1806 Pine St., St. Louis
Fairbanks Morse and Co., 900 S. Wabash Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Reliance Elec. & Engrg. Co., 1058 Idaho Road, Cleveland, Ohio
O. S. Walker Co. Inc., Worcester, Mass.
Westinghouse Elec. and Mfg. Co., East Pittsburgh, Pa.

GLUE HEATERS, Electric

Cutler Hammer, Inc., Milwaukee, Wis.
Westinghouse Elec. and Mfg. Co., East Pittsburgh, Pa.

GOGGLES, Safety

American Optical Company, Southbridge, Mass.

GRADUATING MACHINES

George Gorton Machine Co., 1103-13th St., Racine, Wisc.
Micro Instrument Co., 10 Arrow St., Cambridge, Mass.
Noble and Westbrook Mfg. Co., East Hartford, Conn.

GRAPHITE

Jos. Dixon Crucible Co., Jersey City, N. J.

GREASE

Jos. Dixon Crucible Co., Jersey City, N. J.
Socony Vacuum Oil Co., New York, N. Y.
Standard Oil Company of Indiana, Chicago, Ill.
Stuart Oil Co., D. A., 2727 South Troy St., Chicago, Ill.
Sun Oil Co., Philadelphia, Pa.
Texas Company, 135 E. 42nd St., New York
Tidewater Associated Oil Co., 17 Battery Place, N. Y.

GRINDERS, Hand

Dumore Co., Racine, Wis.
Hisey-Wolf Machine Co., Cincinnati, Ohio
Jos. T. Ryerson & Son, Inc., 2558 W. 16th St., Chicago, Ill.
Standard Electrical Tool Co., 1940 W. 8th St., Cincinnati, Ohio

GRINDERS, Pneumatic

Chicago Pneumatic Tool Co., 6 E. 44th St., New York City
Helwig Mfg. Co., St. Paul, Minn.
Ingersoll-Rand Company, 11 Broadway, New York, N. Y.
Savage Co., W. J., Knoxville, Tenn.

GRINDERS, Railway, Frog and Switch (Manufacturing)

Automatic Machine Co., Bridgeport, Conn.

GRINDING ATTACHMENTS, Pully

Abrasive Machine Tool Co., E. Provience, R. I.
Brown and Sharpe Mfg. Co., Providence, R. I.
Cincinnati Lathe and Tool Co., Oakley, Cincinnati, Ohio
Diamond Machine Co., Providence, R. I.

GRINDING MACHINE ATTACHMENTS

Abrasive Machine Co., East Provirence, R. I.
Brown and Sharpe Mfg. Co., Providence, R. I.
Cincinnati Grinders, Inc., Cincinnati, Ohio
Cullman Wheel Co., Chicago, Ill.
Diamond Machine Co., Providence, R. I.
Norton Company, Worcester, Mass.
Thompson Grinder Co., The, Springfield, Ohio

GRINDING MACHINES, Abrasive Belt

Buckeye Portable Tool Co., Dayton, Ohio
Delta Mfg. Co., 600 E. Vienna Ave., Milwaukee, Wis.
Mattison Machine Works, Rockford, Ill.
Oliver Machinery Co., Grand Rapids, Mich.
Porter Cable Machine Co., Syracuse, N. Y.
Pratt & Whitney Co., Div. Niles-Bemet Pond Co., 436 Capitol Ave., Hartford, Conn.
Production Machine Co., Greenfield, Mass
Walls Sales Corp., 96 Warren St., New York

GRINDING MACHINES, Bench

Black and Decker Mfg. Co., Towson, Md.
Brown-Brockmeyer Co., Dayton, Ohio
Brown and Sharpe Mfg. Co., Providence, R. I.
Champion Blower & Forge Co., Harrisburg, Ave., Lancaster, Pa.

Grinding Machines, Bench (Cont.)
James Clark Jr. Elec. Co., 600 Bergman St., Louisville, Ky.
Cleveland Elec. Motor., 5213 Chester Ave., Cleveland, Ohio
Delta Mfg. Co., Vienna Ave., Milwaukee, Wis.
Forbes & Myers, 170 Union St., Worcester, Mass.
Hisey-Wolf Machine Co., The, Cincinnati, Ohio
Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill.
Marathon Elec. Mfg. Corp., Wausau, Wis.
Oliver Machinery Co., Grand Rapids, Mich.
Porter Cable Machine Co., Syracuse, N. Y.
Pratt & Whitney Div., Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Prosser and Sons, Thos., 15 Gold St., New York City
Ransom Grinding Machine Co., 320-326 Eighth St., Oshkosh, Wis.
Jos. T. Ryerson & Son, Inc., 2558 W. 16th St., Chicago, Ill.
Speedway Mfg. Co., Cicero, Ill.
Standard Electrical Tool Co., Cincinnati
Stanley Elec. Tool Div. of Stanley Works, New Britain, Conn.
Stark Tool Co., Waltham Mass.
Steege Mach. Co., Chicago, Ill.
United States Electrical Tool Co., 2488 W. 6th St., Cincinnati, Ohio
Van Dorn Electric Tool Co., 716 Joppa Road, Towson, Md.
Walker Co., O. S. Worcester, Mass.

GRINDING MACHINES, Centerless
Cincinnati Grinders, Inc., Cincinnati, Ohio
Heald Machine Co., Worcester, Mass.
Production Machine Co., Greenfield, Mass.

GRINDING MACHINES, Chaser or Die
Consolidated Machine Tool Corp., Rochester, N. Y.
Eastern Machine Screw Corp., New Haven, Conn.
Gallmeyer and Livingston Co., Grand Rapids, Mich.
Geometric Tool Co., New Haven, Conn.
Landis Machine Co., Inc., Waynesboro, Pa.
Murchey Machine and Tool Co., Detroit, Mich.
National Acme Co., Cleveland, Ohio
Rickert-Shafer Co., Erie, Pa.
Standard Electrical Tool Co., Cincinnati

GRINDING MACHINES, Chucking
Baird Machine Co., Bridgeport, Conn.
Blanchard Machine Co., Cambridge, Mass.
Bryant Chucking Grinder Co., Springfield, Vt.
Cincinnati Grinders, Inc., Cincinnati, Ohio
Heald Machine Co., Worcester, Mass.
Landis Tool, Waynesboro, Pa.

GRINDING MACHINES, Contour
Baker Bros. Inc., Toledo, Ohio
Covel Mfg. Co., Benton Harbor, Mich.
Production Machine Co., Greenfield, Mass.

GRINDING MACHINES, Cutter and Tool
Brown and Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Machine Co., Cincinnati
Davis Boring Tool Co., Div. Larkin-Packer Co., 6200 Maple Ave., St. Louis, Mo.
Fellows Gear Shaper Co., Springfield, Vt.
Gallmeyer & Livingston Co., Grand Rapids
Gisholt Machine Co., Madison, Wis.
Gorton Machine Co., Geo., Racine, Wis.
Greenfield Tap and Die Corp., Greenfield, Mass.
Landis Tool Co., Waynesboro, Pa.
R. K. LeBlond Machine Tool Co., Cincinnati
Norton Company, Worcester, Mass.
Oliver Instrument Co., Adrian, Mich.
Pratt & Whitney Div, Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Prosser and Sons, Thos., 15 Gold St., New York City
Scherr Co., Inc., Geo., 128 Lafayette St., New York City
Schuyler, W. A. 250 W. 57th St., New York City
Sellers and Co., Inc., Wm., Philadelphia, Pa.
Standard Electrical Tool Co., Cincinnati
Stanley Elec. Tool Div. of Stanley Works, New Britain, Conn.
Steege Machinery Co., Chicago, Ill.
Sundstrand Machine Tool Co., Rockford, Ill.
Thompson Grinder Co., The, Springfield, Ohio
Union Twist Drill Co., Athol, Mass.
Walker Co., O. S. Worcester, Mass.

GRINDING MACHINES, Cylindrical
Arter Grinding Machine Co., Worcester, Mass.
Brown and Sharpe Mfg. Co., Providence, R. I.
Cincinnati Grinders, Inc., Cincinnati, Ohio
Dumore Co., Racine, Wis.
Farrel-Birmingham Co., Asonia, Conn.
Fitchburg Grinding Machine Corp., 67 Walnut St., Fitchburg, Mass.
Greenfield Tap and Die Corp., Greenfield, Mass.
Hisey-Wolfe Machine Co., Cincinnati, Ohio
Kling Brothers Engineering Works, 1320 N. Koster Ave., Chicago, Ill.
Landis Tool Co., Waynesboro, Pa.
Morse Twist Drill & Machine Co., 163 Pleasant St., New Bedford, Mass.
Norton Company, Worcester, Mass.
Thompson Grinder Co., The, Springfield, Ohio

GRINDING MACHINES, Die
Abrasive Machine Tool Co., East Providence, R. I.
Arter Grinding Machine Co., Worcester, Mass.
Black and Decker Mfg. Co., Towson, Md.
Blanchard Machine Co., Cambridge, Mass.
Bridgeport Safety Emery Wheel Co., Bridgeport, Conn.
Bryant Chucking Grinder Co., Springfield, Vt.
James Clark Jr. Elec. Co., 600 Bergman St., Louisville, Ky.
Covel Mfg. Co., Benton Harbor, Mich.
Diamond Machine Co., Providence, R. I.
Dumore Co., Racine, Wis.
Gallmeyer and Livingston Co., Grand Rapids, Mich.
Hanchett Mfg. Co., 906 N. State St., Big Rapids, Mich.
Hisey-Wolf Machine Co., Cincinnati, Ohio
Independent Pneumatic Tool Co., Chicago, Ill.
Madison-Kipp Corp., Madison, Wis.
Mall Tool Company 7740 S. Chicago Ave., Chicago, Ill.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Standard Electrical Tool Co., Cincinnati
Strand Co., N. A., 5001 N. Lincoln St., Chicago, Ill.
Van Dorn Electric Tool Co., 716 Joppa Road, Towson, Md.
Walker Co., O. S., Worcester, Mass.

GRINDING MACHINES, Disk
Besly and Co., Chas. H., 118-124 N. Clinton St., Chicago, Ill.
Cleveland Elec. Motor Co., 5213 Chester Ave., Cleveland, Ohio
Diamond Machine Co., Providence, R. I.
Fitchburg Grinding Machine Corp., 67 Walnut St., Fitchburg, Mass.
Gardner Machine Co., Beloit, Wis.
Hanchett Mfg. Co., Big Rapids, Mich.
Hisey-Wolf Machine Co., The, Cincinnati, Ohio
Oliver Machinery Co., Grand Rapids, Mich.
Porter Cable Machine Co., Syracuse, N. Y.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Production Machine Co., Greenfield, Mass.
Standard Electrical Tool Co., Cincinnati
United States Electrical Tool Co., 2488 W. 6th St., Cincinnati, Ohio
Walls Sales Corp., 96 Warren St., New York

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English Bros. Machy. Co.
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LANCASTER, PA. — Reilly Bros. & Raub.
LOWELL, MASS. — Nebes Machy. & Supply Co.
LOS ANGELES — Ducommun Metals & Supply Co.
Eccles & Davies Machy. Co.
Machinest Tool & Supply Co.
M. N. Thackaberry
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NEWARK — Squier, Schilling & Skiff Abrasive Machine & Supply Co.
NEW HAVEN — C. S. Mersick
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Guarantee Specialty Co.
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ORLANDO, FLA. — Harry P. Leu, Inc.
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W. B. Rapp, Machinery
PITTSBURGH — Standard-Machinists Sup. Co.
PORTLAND, ORE. — J. E. Haseltine & Co.
PROVIDENCE — Belcher & Loomis Hardware Co.
Brownell Machinery Co.
Reynolds Machinery
READING, PA. — Reading Machine & Tool Co.
RICHMOND — Smith-Courtney
ROCHESTER — Erskine-Healy
ROCKFORD — Mid-States Indus. Corp.
SAGINAW, MICH. — Reichle Supply Co.
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C. W. Marwedel
SEATTLE — Cragin & Co.
Seattle Hardware Co.
SOUTH BEND — South Bend Supply Co.
SPRINGFIELD, MASS. — Carlisle Hardware Co.
SYRACUSE — Syracuse Supply
TOLEDO — Cornell Supply Co.
Kirkby Mach. & Supply Co.
National Supply Co.
TORONTO — Canadian Fairbanks-Morse
TROY, N. Y. — Fred K. Blanchard
TULSA — Mach. Tool & Supply Co.
WORCESTER, MASS. — Waite Hdw. Co.
YORK, PA. — York Machy. & Supply Co.

EXPORT DEPT. — Dumore Co. — New York

GRINDING MACHINES, Drill and Tap

Covel Mfg. Co., Benton Harbor, Mich.
Gallmeyer and Livingston Co., Grrand Rapids, Mich.
Hisey-Wolf Machine Co., Cincinnati, Ohio
Oliver Instrument Co., Adrian, Mich.
Sellers & Co., Inc., Wm., Philadelphia, Pa.
Standard Electrical Tool Co., Cincinnati, Ohio
Union Twist Drill Co., Athol, Mass.

GRINDING MACHINES, Face and Ring Wheel

Abrasive Machine Tool Co., East Providence, R. I.
Besly & Co., Chas. H., 118-124 N. Clinton St., Chicago, Ill.
Blanchard Machine Co., Cambridge, Mass.
Bridgeport Safety Emery Wheel Co., Inc., Bridgeport, Conn.
Diamond Machine Co., Providence, R. I.
Fitchburg Grinding Machine Corp., 67 Walnut St., Fitchburg, Mass.
Gardner Machine Co., 410 E. Gardner St., Beloit, Wis.
Hanchett Mfg. Co., Big Rapids, Mich.
Standard Electrical Tool Co., Cincinnati
Walker Co., O. S., Worcester, Mass.

GRINDING MACHINES, Flexible Shaft

Dumore Company, Racine, Wis.
Haskins Co., R. G., 4630 W. Fulton St., Chicago, Ill.
Charles L. Jarvis Co., Gildersleeve, Conn.
McGonegal Mfg. Co., Rutherford, N. J.
Mall Tool Company, 7740 S. Chicago Ave., Chicago, Ill.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Strand Co., N. A., 5001 N. Lincoln St., Chicago, Ill.
Swartz & White Mfg. Co., 215 Washington St., Binghamton, N. Y.
United States Electrical Tool Co., 2488 West 6th St., Cincinnati, Ohio

GRINDING MACHINES, Floor

Bridgeport Safety Emery Wheel Co., Inc., Bridgeport, Conn.
Bryant Machinery and Engineering Co., 400 W. Madison St., Chicago, Ill.
James Clark Jr., Elec. Co., 600 Bergman St., Louisville, Ky.
Delta Mfg. Co., Vienna Ave., Milwaukee, Wis.
Diamond Machine Co., Providence, R. I.
Forbes & Myers, 170 Union St., Worcester, Mass.
Hisey-Wolf Machine Co., The, Cincinnati.
Hobart Bros. Co., Box FR-17, Troy, Ohio
Mall Tool Company, 7740 S. Chicago Ave., Chicago, Ill.
Oliver Machinery Co., Grand Rapids, Mich.
Ranso Grinding Machine Co., 320-326 Eighth St., Oshkosh, Wis.
Rivett Lathe and Grinder Co., Inc., Brighton, Boston, Mass.
Standard Electrical Tool Co., Cincinnati, Ohio
Stokerunit Corp., Milwaukee, Wis.
United States Electrical Tool Co., 2488 W. 6th St., Cincinnati, Ohio
Walker Co., O. S., Worcester, Mass.

GRINDING MACHINES, Gage

Baker Bros. Inc., Toledo, Ohio
Landis Tool Co., Waynesboro, Pa.

GRINDING MACHINES, Gear

Gleason Works, 1000 University Ave., Rochester, N. Y.
Lees-Bradner Co., Cleveland, Ohio
Pratt and Whitney Co., Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford Conn.

GRINDING MACHINES, Internal

Baird Machinery Co., Bridgeport, Conn.
Bryant Chucking Grinder Co., Springfield, Vt.
James Clark Jr. Elec. Co., 600 Bergman St., Louisville, Ky.
Dumore Co., The, Racine, Wis.
Held Machine Co., Worcester, Mass.
Hisey-Wolf Machine Co., The, Cincinnati.
Landis Tool Co., Waynesboro, Pa.
Marburg Bros. Inc., 90 West St., New York.
Rivett Lathe and Grinder Co., Inc., Brighton, Boston, Mass.
Standard Electrical Tool Co., Cincinnati, Ohio
Taylor and Fenn Co., The, Hartford, Conn.
United States Electrical Tool Co., 2488 W. 6th St., Cincinnati, Ohio
Walker Co., O. S., Worcester, Mass.
Wicaco Machine Corp., Stenton Ave., Philadelphia, Pa.

GRINDING MACHINES, Knife and Shear Blade

Abrasive Machine Tool Co., East Providence, R. I.
Atkins & Co., E. C., 402 S. Illinois St., Indianapolis, Ind.
Arter Grinding Machine Co., Worcester, Mass.
Bridgeport Safety Emery Wheel Co., Bridgeport, Conn.
Diamond Machine Co., Providence, R. I.
Hanchett Mfg. Co., Big Rapids, Mich.
Hisey-Wolf Machine Co., Cincinnati, Ohio
Mattison Machine Works, Rockford, Ill.
Rogers & Co., Samuel C., 191 Dutton Ave., Buffalo, N. Y.
Standard Electrical Tool Co., Cincinnati, Ohio
United States Electrical Tool Co., 2488 W. 6th St., Cincinnati, Ohio

GRINDING MACHINES, Lathe Attachment

James Clark Jr., Electric Co., 600 Bergman St., Louisville, Ky.
Dumore Co., Racine, Wis.
Hardinge Bros., Inc., Elmira, N. Y.
Hisey-Wolf Machine Co., Cincinnati, Ohio
McGonegal Mfg. Co., The, Rutherford, N. J.
Rivett Lathe and Grinder Co., Inc., Brighton, Boston, Mass.
Speedway Mfg. Co., Cicero, Ill.
Stark Tool Co., Waltham, Mass.
Standard Electrical Tool Co., Cincinnati, Ohio
Strand Co., N. A., 5001 N. Lincoln St., Chicago, Ill.
United States Electrical Tool Co., 2488 W. 6th St., Cincinnati, Ohio

GRINDING MACHINES, Link, Surface and Internal

Standard Tool Co., 6918 Central Ave., S. E., Cleveland, Ohio
Sundstrand Machine Tool Co., Rockford, Ill.

GRINDING MACHINES, Piston Ring

Arter Grinding Machine Co., Worcester, Mass.
Hanchett Mfg. Co., 906 N. State St., Big Rapids, Mich.

GRINDING MACHINES, Plain

Brown and Sharpe Mfg. Co., Providence, R. I.
Cincinnati Grinders Inc., Cincinnati, Ohio
Diamond Machine Co., Providence, R. I.
Fitchburg Grinding Machine Corp., 67 Walnut St., Fitchburg, Mass.
Greenfield Tap and Die Corp., Greenfield, Mass.
Landis Tool Co., Waynesboro, Pa.
Morse Twist Drill & Machine Co., 163 Pleasant St., New Bedford, Mass.
Norton Co., Worcester, Mass.
Thomas Prosser & Son, 15 Gold St., N. Y.
Standard Electrical Tool Co., Cincinnati, Ohio

GRINDING MACHINES, Portable

Black and Decker Mfg. Co., Towson, Md.
Buckeye Portable Tool Co., Dayton, Ohio
Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y.
James Clark, Jr. Elec. Co., 600 Bergman St., Louisville, Ky.
Diamond Machine Co., Providence, R. I.
Dumore Co., Racine, Wis.
Haskins Co., R. G. 4630 W. Fulton St., Chicago, Ill.
Helwig Mfg. Co., St. Paul, Minn.
Hisey-Wolf Machine Co., The, Cincinnati.
Independent Pneumatic Tool Co., Chicago, Ill.
Ingersoll Rand Co., 11 Broadway, New York
Charles L. Jarvis Co., Gildersleeve, Conn.
Madison Kipp Corp., Madison, Wis.
McGonegal Mfg. Co., Rutherford, Conn.
Mall Tool Company 7740 S. Chicago Ave., Chicago, Ill.
Marathon Elec. Mfg. Corp., Wausau, Wis.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Porter Cable Machine Co., Syracuse, N. Y.
Rotor Air Tool Co., 5704 Carnegie Ave., Cleveland, Ohio
Ryerson & Son, Jos. T., Inc., 2558 W. 16th St., Chicago, Ill.
Savage Co., W. J. Knoxville, Tenn.
Skilsaw, Inc., 3310 Elston Ave., Chicago, Ill.
Standard Electrical Tool Co., Cincinnati, Ohio
Stanley Elec. Tool Div. of Stanley Works, New Britain, Conn.
Strand Co., N. A., 5001 N. Lincoln St., Chicago, Ill.
United States Electrical Tool Co., 2488 W. 6th St., Cincinnati, Ohio
Van Dorn Electric Tool Co., 716 Joppa Road, Towson, Md.

GRINDING MACHINES, Radius

Diamond Machine Co., Providence, R. I.
Landis Tool Co., Waynesboro, Pa.
Sundstrand Machine Tool Co., Rockford, Ill.
Union Twist Drill Co., Athol, Mass.
Van Norman Machine Tool Co., Springfield, Mass.

GRINDING MACHINES, Roll

Cincinnnati Grinders Inc., Cincinnati, Ohio
James Clark Jr. Elec. Co., 600 Bergman St., Louisville, Ky.
Dunmore Co., Racine Wis.
Farrel-Birmingham Co., Ansonia, Conn.
Hisey-Wolf Machine Co., Cincinnati, Ohio
Landis Tool Co., Waynesboro, Pa.
Marburg Bros., Inc., 90 West St., New York
Mesta Machine Co., P. O. Box 1466 Pittsburgh, Pa
Norton Co., Worcester, Mass.
Standard Electrical Tool Co., Cincinnati. Ohio

GRINDING MACHINES, Surface

Abrasive Machine Tool Co., E. Providence, R. I.
American Machine Tool Co., Hackettstown, N. J.
Arter Grinding Machine Co., Worcester, Mass.
Bergram Mech. Engineering Co., New Britain, Conn.
Besly and Co., Chas. H., 118-124 N. Clinton St., Chicago, Ill.
Blanchard Machine Co., Cambridge, Mass.
Bridgeport Safety Emery Wheel Co., Inc., 1302 W. Broad St., Bridgeport, Conn.
Brown and Sharpe Mfg. Co., Providence, R. I.
James Clark, Jr., Elec. Co., 600 Bergman St., Louisville, Ky.
Covel Mfg. Co., Benton, Harbor, Mich.
Diamond Machine Co., Providence, R. I.
Gallmeyer and Livingston Co., Grand Rapids.
Gardner Machine Co., Beloit, Wis.
Hanchett Mfg. Co., Big Rapids, Mich.
Heald Machine Co., Worcester, Mass.
Hisey-Wolf Machine Co., Cincinnati, Ohio
Mattison Machine Works, Rockford, Ill.
Norton Co., Worcester, Mass.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Reid Brothers Co., Beverly, Mass.
Standard Electrical Tool Co., Cincinnati. Ohio
Steege Mach. Co., Chicago, Ill.
Thompson Grinder Co., Springfield, Ohio
United States Electrical Tool Co., 2488 W. 6th St., Cincinnati, Ohio
Walker and Co., O. S., Worcester, Mass.
Wesson Co., Detroit, Mich.
Williams, White & Co., Moline, Ill.

GRINDING MACHINES, Swing

Diamond Machine Co, Providence, R. I.
Standard Electrical Tool Co., Cincinnati, Ohio

GRINDING MACHINES, Universal

Brown and Sharpe Mfg. Co., Providence, R. I
Cincinnati Grinders, Inc., Cincinnati, Ohio
Covel Mfg. Co., Benton, Harbor, Mich.
Fitchburg Grinding Machine Corp., 67 Walnut St., Fitchburg, Mass.
Greenfield Tap and Die Corp., Greenfield, Mass.
Landis Tool Co., Waynesboro, Pa.
Morse Twist Drill & Machine Co., 163 Pleasant St., New Bedford, Mass.
Norton Co., Worcester, Mass.
Rivett Lathe and Grinder Co. Inc., Brighton, Boston, Mass.
Steege Machine Co., Chicago, Ill.
Thompson Grinder Co., Springfield, Ohio

GRINDING MACHINES, Vertical

Abrasive Machine Tool Co., East Providence, R. I.
Besley & Co., Charles H., 118-124 N. Clinton St., Chicago, Ill.
Bergram Mech. Engineering Co., New Britain, Conn.
Blanchard Machine Co, 64 State St., Cambridge, Mass.
Fitchburg Grinding Machine Corp., 67 Walnut St., Fitchburg, Mass.
Galleyer & Livingston Co., 336 Straight Ave., S.W., Grand Rapids, Mich.
Gardner Machine Co., 410 E. Gardner St., Beloit, Wis.
General Machinery Corp. (Niles Tool Wks. Div.) 545 N. Third St., Hamilton, Ohio
Hanchett Mfg. Co., 906 North State St., Big Rapids, Mich.
Hisey-Wolf Machine Co., Cincinnati, Ohio
Norton Co., Worcester, Mass.
Pratt & Whitney Co., 436 Capitol Ave., Hartford, Conn.
Standard Electrical Tool Co., 1940 W. 8th St., Cincinnati, Ohio
United States Electrical Tool Co., 2488 W. 6th St., Cincinnati, Ohio

GRINDING SPINDLE

Bryant Chucking Grinder Co., 257 Clinton St., Springfield, Vt.
Dumore Co., The, 135 14th St., Racine, Wis.
Ex-Cell-O Aircraft & Tool Corp., 1200 Oakman Blvd., Detroit, Mich.
Heald Machine Co., New Bond St., Worcester, Mass.
Rivett Lathe & Grinder Co. Inc., 20 Riverview Rd., Brighton, Boston, Mass.
Standard Electrical Tool Co., 1940 W. 8th St., Cincinnati, Ohio

GRINDING WHEEL DRESSERS (see Dressers, Grinding Wheel)

GRINDING WHEELS

Abrasive Company, Tacony and Fraley St., Philadelphia, Pa.
Atkins & Co., E. C., 424 S. Illinois St., Indianapolis, Ind.
Bakelite Corp., Bound Brook, N. J.
Bay State Abrasive Products Co., Union St., Westboro, Mass.
Besley & Co., Charles H., 118-124 N. Clinton St., Chicago, Ill.
Black & Decker Mfg. Co., Towson, Md.
Blanchard Machine Co., 4 State St., Cambridge, Mass.
Bridgeport Safety Emery Wheel Co., Inc., Bridgeport, Conn.
Carborundum Co., Niagara Falls, N. Y.
Cincinnati Milling Machine Co., Cincinnati, Ohio
Gardner Machine Co., 410 E. Gardner St., Beloit, Wis.
General Plastics, Inc., North Tonawanda, N. Y.
De Sanno & Son, A. P., Philadelphia, Pa.
Gilmore & Co., F. F., 112 Dartmouth St., Boston, Mass.
Hanchett Mfg. Co., 906 N. State St., Big Rapids, Mich.
Macklin Co., Jackson, Mich.
Mall Tool Company, 7740 S. Chicago Ave., Chicago, Ill.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., Passaic, N. J.
Mid-West Abrasive Co., 3189 Beaufait St., Detroit, Mich.

Grinding Wheels—(Cont.)
Norton Company, Worcester, Mass.
Prosser & Sons, Thos., 15 Gold St., New York
Sterling Grinding Wheel Co., Broad Ave., Tiffin, Ohio
Vitrified Wheel Co., Emery St., Westfield, Mass.
Western Tool & Mfg. Co., Springfield, Ohio

GUARDS FOR GRINDING WHEELS
Gallmeyer & Livingston Co., 336 Straight Ave., S.W., Grand Rapids, Mich.
Hisey-Wolf Machine Co., Cincinnati, Ohio
Pratt & Whitney Div. Niles-Belmont-Ponds Co., 436 Capitol Ave., Hartford, Conn.
Standard Electrical Tool Co., 1940 W. 8th St., Cincinnati Ohio

GUARDS, PRESS
Humm Tool & Mach. Co., 253 Sheffield Ave., Brooklyn, N. Y.

HACK SAW BLADES
Armstrong-Blum Mfg. Co., 333 N. Francisco Ave., Chicago, Ill.
Atkins & Co., E. C., 424 S. Illinois St., Indianapolis, Ind.
Barnes Co., Inc., W. O. 1297 Terminal Ave., Detroit, Mich.
Clemson Bros. Inc., 22 Cottage St., Middletown, N. Y.
Disston & Sons, Inc., Henry, Tacony, Philadelphia, Pa.
Racine Tool & Machine Co., 1751 State St., Racine, Wis.
Starrett Co., L. S., Crescent St., Athol, Mass. Mass.
Victor Saw Works, Inc., 22 Cottage St., Middletown, N. Y.

HACK SAW FRAMES
Armstrong-Blum Mfg. Co., 333 N. Francisco Ave., Chicago, Ill.
Atkins & Co., E. C., 424 S. Illinois St., Indianapolis, Ind.
Clemson Bros. Inc., 22 Cottage St., Middletown, N. Y
Disston & Sons, Inc., Henry, Tacony, Philadelphia, Pa.
Starrett Co., The L. S., Crescent St., Athol, Mass.

HAMMERS, Drop
Bliss Co., E. W., Brooklyn, N. Y.
Chambersburg Engineering Co., Chambersburg, Pa.
Erie Foundry Co., Erie, Pa.
Farrel-Birmingham Co. Inc., Ansonia, Conn.
Henderson Machine Co., 5032 Germantown Ave., Philadelphia, Pa.
Marburg Brothers, Inc., 90 West St., N. Y.
Williams, White & Co., Moline, Ill.

HAMMERS, Portable Power
Black & Decker Mfg. Co., Towson, Md.
Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y.
Ingersoll-Rand & Co., 11 Bway., N. Y. C.
Ryerson & Son, Inc., Jos. T., 2558 W. 16th St., Chicago, Ill.
Savage Co., W. J. Clinch Ave. and Tenth St., Knoxville, Tenn.
Speedway Mfg. Co., 1834 S. 52nd Ave., Cicero, Ill.
United States Electrical Tool Co., 2488 W. 6th St., Cincinnati, Ohio
Stanley Elec. Tool Div. of Stanley Works, New Britain, Conn.

HAMMERS, Power
Champion Blower & Forge Co., Harrisburg Ave., Lancaster, Pa.
Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y.
Erie Foundry Co., Erie, Pa.
General Machine Corp. (Niles Tool Wks. Div.) 545 N. Third St., Hamilton, Ohio
Marburg Brothers, Inc., 90 West St., New York, N. Y.
Ingersoll-Rand & Co., 11 Bway, N. Y.
Ryerson & Son, Inc., Jos. T., 2558 W. 16th St., Chicago, Ill.
Savage Co., W. J. Clinch Ave. and Tenth St., Knoxville, Tenn.

HAMMERS, Softfaced
Bonney Forge & Tool Works, Allentown, Pa.
Chicago Rawhide Mfg. Co., Chicago, Ill.
Goodrich Co., B. F., 576 South Main St., Akron, Ohio
Greene, Tweed & Co., 109 Duane St., N. Y.
Stanley Tools, New Britain, Conn.

HAMMERS, Steam
Erie Foundry Co., Erie, Pa.

HANDLES, File
American Swiss Fire & Tool Co., Elizabeth, N. J
Delta File Works, 4837 James St., Philadelphia, Pa.
Disston & Sons, Inc., Henry, Tacony, Philadelphia, Pa.
Nicholson File Co., Providence, R. I.

HAND SCRAPERS
Anderson Bros., Mfg. Co., Rockford, Ill.
Disston & Sons, Inc., Henry, Tacony, Philphia, Pa.

HANGERS, Shaft
Boston Gear Works, Inc., North Quincy, Mass.
Diamond Chain & Mfg. Co., 402 Kentucky Ave., Indianapolis, Ind.
Dodge Mfg. Corp., Mishawaka, Ind.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.
Hanson Clutch & Machinery Co., Tiffin, Ohio
Link-Belt Co., 2410 W. 18 St., Chicago
Morse Chain Co., Ithaca, N. Y.
S.K.F. Industries, Inc., Philadelphia, Pa.
Savage Co., W. J., Clinch Ave. and Tenth St., Knoxville, Tenn.
Standard Pressed Steel Co., Jenkintown, Pa.

HARD-FACING ALLOYS
Air Reduction Sales Co., 60 E. 42nd St., N. Y.
Colmonoy Inc., P. O. Box 977, Los Nietos, Calif.
Haynes Stellite Co., Kokomo, Ind.
Lincoln Electric Co., Colt Road and Kirby Ave., Cleveland, Ohio
Ludlum Steel Co., Lock Box 38, Watervliet, N. Y.
Michigan Tool Co., Detroit, Mich.
Prosser & Son, Thomas, 15 Gold St., N. Y.
Tungsten Elec. Corp., New York City, N. Y.

HARDNESS MEASURING INSTRUMENTS
Olsen Testing Machine Co., Tinius, 500 N. 12th St., Philadelphia, Pa.
Shore Instrument and Mfg. Co., Jamaica, N. Y.
Wilson Mechanical Instrument Co., 383 Concord Ave., New York, N. Y.

HEADING MACHINES
Acme Machinery Co., 4533 St. Clair Ave., Cleveland, Ohio
Ajax Mfg. Co., Euclid Branch P. O., Cleveland, Ohio
National Machinery Co., Tiffin, Ohio
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.

HEADS, Tool
Production Tool Co., Bridgeport, Conn.

HEAT TREATING
Air Reduction Sales Co., 60 E. 42nd St., N. Y.
American Gas Furnace Co., Elizabeth, N. J.
Chapman Valve Mfg. Co., Pinevale St., Indian Orchard, Mass.
Ex-Cell-O Aircraft & Tool Corp., 1200 Oakman Blvd., Detroit, Mich.
Houghton & Co., E. F., Philadelphia, Pa.
Meisel Press Mfg. Co., Boston, Mass.
Rickert-Shafer Co., 613 W. 11th St., Erie, Pa.
Strong, Carlisle & Hammond Co., 1392 W. Third St., Cleveland, Ohio
Surface Combustion Corp., Toledo, Ohio
U. S. Tool Co. Inc., Ampere, N. J.
Vincent Steel Process Co., 2434 Bellevue Ave., Detroit, Mich.
Wiedemann Machine Co., 1815 Sedgley Ave., Philadelphia, Pa.

HEATERS, Space
Anderson Co., V. D., 1935 W. 96th St., Cleveland, Ohio
American Foundry Equipment Co., Mishawaka, Ind.
Buffalo Forge Co., 448 Broadway, Buffalo, N. Y.
Surface Combustion Corp., Toledo, Ohio
Trent Co., Harold E., 618 N. 54th St., Philadelphia, Pa.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

HOBBING MACHINES
Adams Co., E. Fourth St., Dubuque, Iowa
Barber-Colman Co., River & Loomis Sts., Rockford, Ill.
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland Hobbing Machine Co., E. 152nd St., Cleveland, Ohio
Gould & Eberhardt, 480 Chancellor Ave., Irvington, N. J.
Scherr Co., Inc., Geo., 128 Lafayette St., New York, N. Y.
Steege Machy Co., Chicago, Ill.

HOBS
Barber-Colman Co., River & Loomis Sts., Rockford, Ill.
Brown & Sharpe Mfg. Co., Providence, R. I.
Hanson-Whitney Machine Co., 169 Bartholomew Ave., Hartford, Conn.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
Michigan Tool Co., Detroit, Mich.
National Twist Drill & Tool Co., 6522 Brush St., Detroit, Mich.
Pratt & Whitney Div. Niles-Bement-Pond Co., 435 Capitol Ave., Hartford, Conn.
Union Twist Drill Co., Athol, Mass.

HOISTS, Air
Chicago Pneumatic Tool Co., 6 E. 44th St., New York
Curtis Pneumatic Machinery Co., 1924 Kienler Ave., St. Louis, Mo.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hannifin Mfg. Co., 621 S. Kolmar Ave., Chicago, Ill.
Ingersoll-Rand Co., 11 Broadway, New York, N. Y.
Logansport Machine Inc., Logansport, Ind.
Savage Co., W. J., Clinch Ave. and Tenth St., Knoxville, Tenn.
Northern Engineering Works, Chene and Atwater Sts., Detroit, Mich.
Tomkins-Johnson Co., 615 N. Mechanic St., Jackson, Mich.

HOIST, Chain
Ford Chain Block Div. Amer. Chain & Cable Co. Inc., Philadelphia, Pa.
Northern Engineering Works, Chene and Atwater Sts., Detroit, Mich.
Osborne Mfg. Co., 5401 Hamilton Ave., Cleveland, Ohio
Round & Son, David, Newburgh Station, Cleveland, Ohio
Ryerson & Co. Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Savage Co., W. J., Clinch Ave. and Tenth St., Knoxville, Tenn.
Union Mfg. Co., New Britain, Conn.
Wright Mfg. Div. of Amer. Chain & Cable Co. Inc., York, Pa.
Yale & Towne Mfg. Co., Philadelphia Division, 4530 Tacony St., Philadelphia, Pa.

HOISTS, Electric
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Engineering Co., 2407 Aramingo Ave., Philadelphia, Pa.
Euclid Crane & Hoist Co., Euclid, Ohio
Electric Lift, Inc., 30 Church St., New York City
Harnischfeger Corp., 4400 W. National Ave., Milwaukee, Wis.
Independent Pneumatic Tool Co., Chicago, Ill.
Northern Engineering Works, Chene & Atwater Sts., Detroit, Mich.
Osborne Mfg. Co., 5401 Hamilton Ave., Cleveland, Ohio
Philadelphia Gear Works, Philadelphia, Pa
Savage Co., W. J. Clinch Ave. and Tenth St., Knoxville, Tenn.
Yale & Towne Mfg. Co., Philadelphia Div. 4530 Tacony St., Philadelphia, Pa.

HOISTS, Pneumatic
Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y.
Curtis Pneumatic Machinery Co., 1924 Kiener Ave., St Louis, Mo.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Independent Pneumatic Tool Co., Chicago, Ill
Ingersoll-Rand Co., 11 Broadway, New York
Keckley, C. O., 567 Washington Blvd., Chicago, Ill.
Logansport Machine Inc., Logansport, Indiana
Northern Engineering Works, Chene & Atwater Sts., Detroit, Mich.
Tompkins-Johnson Co., 615 Mechanic St., Jackson, Mich.

HOLDERS, Adjustable for Gage Blocks
Ford Motor Co., Johanssen Div., 3674 Schaefer Rd., Dearborn, Mich.

HOLDERS, Floating
Eclipse Counterbore Co., Detroit, Mich.
Gairing Tool Co., 629 Lafayette Blvd., Detroit, Mich.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio

HOLDERS, Stop Collar
Eclipse Counterbore Co., Detroit, Mich.
Gairing Tool Co., 629 Lafayette Blvd., Detroit, Mich.

HONING MACHINES
Barnes Drill Co., 814 Chestnut St., Rockford, Ill.
Hutto Engineering Co., 515 Lycaste Ave., Detroit, Mich.

HONING TOOLS
Hutto Machine Div. of Carborundum Co., Detroit, Mich.
Micromatic Hone Corp., 7401 Dubois St., Detroit, Mich.

HOSE, Flexible Metal
American Brass Co. (American Metal Hose Branch) Waterbury, Conn.
Tite Flex, Metal Hose Co., 500 Frelinghuysen Ave., Newark, N. J.

HOSE, Rubber
De Vilbiss Co., Toledo, Ohio
Dayton Rubber Mfg. Co., Dayton, Ohio
Electric Hose and Rubber Co., Wilmington, Del.
Gates Rubber Co., Denver, Colo.
Manhattan Rubber Mfg. Div. of Raybestos Manhattan Inc., Passaic, N. J.

HYDRAULIC MACHINERY
American Broach & Machine Co., 415 W. Huron St., Ann Arbor, Mich.
American Engineering Co., 2407 Armingo Ave., Philadelphia, Pa.
Baldwin-Southwark Corp., Paschall P. O. Station, Philadelphia, Pa.
Baush Machine Tool Co., 156 Wason Ave., Springfield, Mass.
Buckeye Iron & Brass Works, 326 E. 3rd St., Dayton, Ohio
Chambersburg Engineering Co., Chambersburg, Pa.

Hydraulic Machinery—(Cont.)
Cross Gear & Machine Co., 3250 Bellevue, Detroit, Mich.
Dudgeon, Inc., Richard, 24 Columbia St., New York, N. Y.
Dunning & Boschert Press Co., Inc., 390 W. Water St., Syracuse, N. Y.
Earle Gear & Machine Co., 4723 Stenton, Ave., Philadelphia, Pa.
Elmes Engineering Wks., Chas. F., 1001 Fulton St., Chicago, Ill.
Erie Foundry Co., Erie, Pa.
Farrel-Birmingham Co. Inc., Ansonia, Conn.
Fox Machine Co., 1410 W. Ganson St., Jackson, Mich.
Hannifin Mfg. Co., 621 S. Kolmar Ave., Chicago, Ill.
Hydraulic Press Mfg. Co., Mount Gilead, Ohio
Keckley, C. O., 567 Washington Blvd., Chicago, Ill.
Lake Erie Engineering Corp., Kenmore Station, Buffalo, N. Y.
Lapointe Machine Tool Co., 34 Tower St., Hudson, Mass.
Monarch Machine Tool Co., Sidney, Ohio
National Automatic Tool Co., S. 7th and N Sts. Richmond, Ind.
Oilgear Co., The, 1430 W. Bruce St., Milwaukee, Wis.
Porter-Cable Machine Co., 1725 N. Salina St., Syracuse, N. Y.
Racine Tool & Machine Co., 1751 State St., Racine, Wis.
Tomkins-Johnson Co., 615 N. Mechanic St., Jackson, Mich.
United Eng. & Fdry. Co., Pittsburgh, Pa.
Van Atta & Co., Inc., E. B., Penn Ave., Olsen, N. Y.
Vickers, Inc., 1400 Oakman Blvd., Detroit
Watson-Stillman Co., New York, N. Y.
Williams, White & Co., Moline, Ill.

HYDRAULIC POWER UNITS
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Engineering Co., 2407 Armingo Ave., Philadelphia, Pa.
Baldwin-Southwark Corp., Paschall P. O. Station, Philadelphia, Pa.
Chambersburg Enginering Co., Chambersburg, Pa.
Elmes Engineering Wks., Chas. F., 1001 Fulton St., Chicago, Ill.
Ex-Cell-O Aircraft & Tool Corp., 1200 Oakman Blvd., Detroit, Mich.
Foote-Burt Co., 13000 St. Clair Ave., Cleveland, Ohio
Fox Machine Co., 1410 W. Genson St., Jackson, Mich.
Hoefer Mfg. Co., 213 S. Chicago Ave., Freeport, Ill.
Homestead Valve Mfg. Co., Coraopolis, Pa.
Hydraulic Press Mfg. Co., Mount Gilead, Ohio
Keckley Co., C. O., 138 Washington Blvd., Chicago, Ill.
Lapointe Machine Tool Co., 34 Tower St., Hudson, Mass.
Leland Gifford Co., Worcester, Mass.
Logansport Machine Inc., Logansport, Ind.
National Automatic Tool Co., S. 7th and N Sts., Richmonnd, Id.
New Britain-Gridley Machine Div. New Brittain Machine Co., 140 Chestnut St., New Britain, Conn.
Oilgear Co., 1403 W. Bruce St., Milwaukee, Wis.

HYDRAULIC POWER UNITS (Cont'd)
Racine Tool & Machine Co., 1751 State St., Racine, Wis.
Roper Corp., Geo. W., Blackhawk Park Ave., Rockford, Ill.
Sundstrand Machine Tool Co., Rockford, Ill.
Tomkins-Johnson Co., 615 N. Mechanic St., Jackson, Mich.
Vickers Incorporated, 140 Oakman Blvd., Detroit, Mich.

HYDRAULIC PRESSES (see Presses, Hydraulic)

INDEX BASE
Sundstrand Machine Tool Co., Rockford, Ill.

INDEX CENTERS
Abrasive Machine Tool Co., East Providence, R. I.
Brown & Sharpe Mfg. Co., Providence, R. I.
Gould & Eberhardt, 480 Chancellor Ave., Irvington, N. J.
Hendey Machine Co., 105 Summer St., Torrington, Conn.
Knight Machinery Co., W. B., 3920 W. Pine Blvd., St Louis, Mo.
Stark Tool Co., Waltham, Mass.

INDEX DRILL
Huot Mfg. Co., 128 E. 10th St., St. Paul, Minn.

INDEX PLATES
Brown & Sharpe Mfg. Co., Providence, R. I.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Stark Tool Co., Waltham, Mass.

INDEX TABLES
Buhr Machine Tool Co., 839 Greene St., Ann Arbor, Mich.
Cleveland Universal Jig Co., 13325 St. Clair Ave., Cleveland, Ohio
Ex-Cell-O Aircraft & Tool Corp., 1200 Oakman Blvd., Detroit, Mich.
Knight Machinery Co., W. B., 3920 W. Pine Blvd., St. Louis, Mo.

INDICATORS, Dial (see Gages, Dial)

INDICATORS, Speed
Atkins & Co., E. C., 424 S. Illinois St., Indianapolis, Ind.
Bristol Co., Waterbury, Conn.
Brown & Sharpe Mfg. Co., Providence, R. I.
Scherr Co., Inc., Geo., 128 Lafayette St., N. Y.
Starrett Co., L. S., Crescent St., Athol, Mass.
Veeder-Root Incorporated, Hartford, Conn.
Western Electrical Inst. Corp., 614 Freylinghuysen Ave., Newark, N. J.

INDICATORS, Temperature
Bristol Co., Waterbury, Conn.
Brown Instrument Co., (A Div. of Minneapolis-Honeywell Reg. Co., 4501 Wayne Ave., Philadelphia, Pa.
Foxboro Co., 122 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia, Pa.
Partlow Corp., 2 Campion Road, New Hartford, N. Y.
Tagliabue Mfg. Co., C. J., Park & Nostrand Ave., Brooklyn, N. Y.
Taylor & Fenn Co., 94 Arch St., Hartford, Conn.
Western Electrical Inst. Corp., 614 Freylinghuysen Ave., Newark, N. J.

INDICATORS, Test
Brown & Sharpe Mfg. Co., Providence, R. I.
Brown Instrument Co., (A Div. of Minneapolis-Honeywell Reg. Co., 4501 Wayne Ave., Philadelphia, Pa.
Federal Products Co., 144 Eddy St., Providence, R. I.
Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia, Pa.
Randall & Stickney, Waltham, Mass.
Starrett Co., L. S., Crescent St., Athol, Mass. Mass.
Tagliabue Mfg. Co., C. J., Park & Nostrand Ave., Brooklyn, N. Y.
Van Keuren Co., 12 Copeland St., Watertown, Mass.

INSULATING MACHINES
Syncro Machine Co., 187 Sylvan Ave., Newark, N. J.

INSULATING MATERIALS, Felt, Fibre, Bakelite and Mica
Bakelite Corp., Bound Brook, N. J.
Continental Diamond Fibre Co., Newark, Del.
Felters Co., Inc., 210 South St., Boston, Mass.
Formica Insulation Co., 4614 Spring Grove Ave., Cincinnati, Ohio
General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

INSTRUMENTS, Electrical Measuring
Bristol Company, Waterbury, Conn.
Brown Instrument Co., (A Div. of Minneapolis-Honeywell Reg. Co., 4501 Wayne Ave., Phil., Pa.
General Electric Co., Schenectady, N. Y.
Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia, Pa.
Western Electrical Inst. Corp., 614 Freylinghuysen Ave., Newark, N. J.
Foxboro Co., 122 Neponset Ave., Foxboro, Mass.
United Eng. & Fdry. Co., Pittsburgh, Pa.
Westinghouse Elec. & Mfg. Co., East Pittsburg, Pa.

INSURANCE
Liberty Mutual Insurance Co., Boston, Mass.

JACKETS, Foundry
American Foundry Equipment Co., Mishawaka, Ind.

JACKS, Hydraulic
Black Hawk Mfg. Co., Milwaukee, Wis.
Richard Dudgeon, Inc., 24 Columbia St., N. Y.
Charles F. Elmes Engineering Works, 1001 Fulton St., Chicago, Ill.
Watson-Stillman Co., Roselle, N. J.

JACKS, Planer
Armstrong Bros., Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Starrett Co., L. S., Crescent St., Athol, Mass. Mass.

JAWS FOR PRECISION GAGE BLOCKS
Ford Motor Co., Johansson Div., 3674 Shaefer Rd., Dearborn, Mich.

JIGGS AND FIXTURES (see Contract Work)

JIG BORERS (see Boring, Machines, Jig)

KEYS, Machine
Morton Mfg. Co., Muskegon Heights, Mich.

KEYS, Woodruff
Morton Mfg. Co., Muskegon Heights, Mich.

KEYSEATING MACHINES
American Broach & Machine Co., 415 W. Huron St., Ann Arbor, Mich.
Baker Bros., Inc., Post St., Toledo, Ohio
Consolidated Machine Tool Corp., Rochester, N. Y.
Davis Keyseater Co., Rochester, N. Y.
General Machinery Corp. (Niles Tool Wks. Div.) 545 N. Third St., Hamilton, Ohio
Mitts & Merrill, 913 Tilden St., Saginaw, Mich.
Morton Mfg. Co., Muskegon Heights, Mich.
National Machine Tool Co., 2272 Spring Grove Ave., Cincinnati, Ohio

KNURL HOLDERS
American Swiss File & Tool Co., Elizabeth, N. J.
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago., Ill.
Brown & Sharpe Mfg. Co., Providence, R. I.
Graham Mfg. Co., 73 Willard Ave., Providence, R. I.
Pratt & Whitney, Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Wade Tool Co., 49 River St., Waltham, Mass.

KNURLS
American Swiss File & Tool Co., Elizabeth, N. J.
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Brown & Sharpe Mfg. Co., Providence, R. I.
Graham Mfg. Co., 73 Willard Ave., Providence, R. I.
Pratt & Whitney, Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Williams Co., J. H., 75 Spring St., N. Y. City

LABORATORY WARE, Refractory
Carborundum Co., Niagara Falls, N. Y.
Norton Co., Worcester, Mass.

LACQUERS, Nitrocellulose
Maas & Waldstein, Newark, N. J.

LACQUERS, Phenolinold
Bakelite Corp., Bound Brook, N. J.

LAMPS, Electric
General Electric Co., Schenectady, N. Y.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

LAMPS, Machine and Bench
Fostoria Pressed Steel Corp., Fostoria, Ohio

LAPPING MACHINES, Centerless
Cincinnati Grinders, Inc., Cincinnati, Ohio
Production Machine Co., Greenfield, Mass.

LAPPING MACHINES, Cylindrical and Flat
Diamond Machine Co., Providence, R. I.
Hutto Division of Carborundum Co., 515 Lycaste Ave., Detroit, Mich.
Marburg Brothers, Inc., 90 West St., N. Y.
Moline Tool Co., 102 Twentieth St., Moline, Ill.
Norton Co., Worcester, Mass.
Sellers & Co. Inc., William, 1600 Hamilton St., Philadelphia, Pa.

LAPS, Gear
Fellows Gear Shaper Co., 78 River St., Springfield, Vt.
Vinco Tool Co., 7350 Central Ave., Detroit.

LATHE ATTACHMENTS
Atlas Press Co., 1849 N. Pitcher St., Kalamazoo, Mich.
Bradford Machine Tool Co., 657 Evans St., Cincinnati, Ohio
Cincinnati Lathe & Tool Co., Oakley, Cincinnati, Ohio
Cullman Wheel Co., Chicago, Ill.
Gisholt Machine Co., 1301 E. Washington Ave., Madison, Wis.
Hardinge Brothers, Inc., Elmira, N. Y.
Hendey Machine Co., 105 Summer St., Torrington, Conn.
LeBlond Machine Tool Co., R. K., Madison and Edwards Roads, Cincinnati, Ohio
McCrosky Tool Corp., 1340 80 S. Main St., Meadville, Pa.
Monarch Machine Co., Sidney, Ohio
Porter-Cable Machine Co., 1725 N. Salina St., Syracuse, N. Y.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Reed-Prentice Co., 677 Cambridge St., Worcester, Mass.
Rivett Lathe & Grinder Co. Inc., 20 Riverview Rd., Brighton, Boston, Mass.
Rockford Machine Tool Co., Rockford, Ill.
South Bend Lathe Works, South Bend, Ind.
Stark Tool Co., Waltham, Mass.

LATHE DRIVES
Cincinnati Lathe & Tool Co., Oakley, Cincinnati, Ohio
Cleveland Elec. Motor Co., 5213 Chester Ave., Cleveland, Ohio
Cullman Wheel Co., 1344 Altgeld St., Chicago.
Hardinge Brothers, Inc., Elmira, N. Y.
Reed-Prentice Co., 677 Cambridge St., Worcester, Mass.
Rivett Lathe & Grinder Inc., Brighton, Boston, Mass.

LATHE TOOLS
Apex Tool & Cutter Co., Shelton, Conn.
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Carboly Co. Inc., 2987 E. Jefferson Ave., Detroit, Mich.
Cincinnati Lathe & Tool Co., Oakley, Cincinnati, Ohio
Colonial Broach Co., Detroit, Mich.
Columbia Tool Steel Co., 425 E. 14th St., Chicago, Ill.
Detroit Tap & Tool Co., Detroit, Mich.
Eclipse Counterbore Co., Detroit Mich.
Ex-Cell-O Aircraft and Tool Corp., 1200 Oakman Blvd., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Gisholt Machine Co., 1301 E. Washington Ave., Madison, Wis.
Gorham Tool Co., 14400 Woodrow Wilson Ave., Detroit, Mich.
Haynes Stellite Co., Kokomo, Ind.
Hendey Machine Co., 105 Summer St., Torrington, Conn.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
LeBlond Machine Tool Co., R. K., Madison and Edwards Rds., Cincinnati, Ohio
Michigan Tool Co., Detroit, Mich.
O. K. Tool Co., Shelton, Conn.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
R. & L. Tools, Nicetown, Phila., Pa.
Ready Tool Co., 550 Iranistan Ave., Bridgeport, Conn.
Wesson Co., Detroit, Mich.
Western Tool & Mfg. Co., Springfield, Ohio

LATHES, AUTOMATIC AND SEMI-AUTOMATIC
Automatic Machine Co., Bridgeport, Conn.
Baird Machine Co., Bridgeport, Conn.
Cleveland Automatic Mach. Co., Ashland, Rd., Cleveland, Ohio
Bullard Co., Canfield Ave., Bridgeport, Conn.
Foster Machine Co., 1100 Beasley Ave., Elkhart, Ind.
Gisholt Machine Co., 1201 E. Washington Ave., Madison, Wis.
Jones & Lamson Machine Co., Springfield, Vt.
LeBlond Machine Tool Co., R. K., Madison and Edwards Rds, Cincinnati, Ohio
Lodge & Shipley Machine Tool Co., 3055 Colerain Ave., Cincinnati, Ohio
Monarch Machine Co., Sidney, Ohio
National Acme Co., Cleveland, Ohio
Porter-Cable Machine Co., 1725 N. Salina St., Syracuse, N. Y.
Potter & Johnston Machine Co., Pawtucket, R. I.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Reed-Prentice Co., 677 Cambridge St., Worcester, Mass.
Seneca Falls Machine Co., Seneca Falls, N. Y.
Sundstrand Machine Tool Co., Rockford, Ill.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio
Wickes Bros., 512 N. Water St., Saginaw, Mich.

LATHES, AUTOMATIC FORM TURNING
American Tool Works Co., Pearl & Eggleston Aves., Cincinnati, Ohio
Bullard Co., Canfield Ave., Bridgeport, Conn.
LeBlond Machine Tool Co., R. K., Cincinnati, Ohio
Monarch Machine Co., The, Sidney, Ohio
Potter & Johnston Machine Co., Pawtucket, R. I.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Reed-Prentice Co., 677 Cambridge Sts., Worcester, Mass.
Seneca Falls Machine Co., Seneca Falls, N. Y.
United Engrg. & Foundry Co., Pittsburgh, Pa.

LATHES, Bench
Ames Co., B. C. Waltham, Mass.
Atlas Press Co., 1849 N. Pitcher St., Kalamazoo, Mich.
Bradford Machine Tool Co., 657 Evans St., Cincinnati, Ohio
Champion Blower and Forge Co., Harrisburg Ave., Lancaster, Pa.
Hardinge Brothers Inc., Elmira, N. Y.
LeBlond Machine Tool Co., R. K., Madison and Edwards Rds. Cincinnati, Ohio
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Rivett Lathe & Grinder Co., Inc., 29 Riverview Rd., Brighton, Boston, Mass.
Seneca Falls Machine Co., Seneca Falls, N. Y.
Sidney Machine Tool Co., Sidney, Ohio
South Bend Lathe Works, South Bend, Ind.
Stark Tool Co., Waltham, Mass.
Wade Tool Co., 49 River St., Waltham, Mass.

LATHES, Bottle Mold
American Tool Works Co., Pearl and Eggleston Aves., Cincinnati, Ohio
LeBlond Machine Tool Co., R. K., Cincinnati, Ohio
Monarch Machine Co., Sidney, Ohio
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio

LATHES, CRANKSHAFT
American Tool Works Co., Pearl and Eggleston, Aves., Cincinnati, Ohio
Consolidated Machine Tool Corp., Rochester, N. Y.
LeBlond Tool Co., R. K., Madison and Edwards Rds., Cincinnati, Ohio
Lodge & Shipley Machine Tool Co., 3055 Colerain Ave., Cincinnati, Ohio
Marburg Brothers, Inc., 90 West St., N. Y.
Potter & Johnston Machine Co., Pawtucket, R. I.
Sundstrand Machine Tool Co., Rockford, Ill.
Wickes Bros., 512 N. Water St., Saginaw, Mich.

LATHES, Double-End Turning and Facing
Sundstrand Machine Tool Co., Rockford, Ill.

LATHES, Engine
American Tool Works Co., Pearl and Eggelston Aves., Cincinnati, Ohio
Boye & Emmes Machine Tool Co., Cincinnati.
Bryant Machinery & Engrg. Co., 400 W. Madison St., Chicago, Ill.
Champion Blower and Forge Co., Harrisburg Ave., Lancaster, Pa.
Cincinnati Lathe & Tool Co., Oakley, Cincinnati, Ohio
Consolidated Machine Tool Corp., Rochester, N. Y.
General Machinery Corp., (Niles Tool Wks. Div.), 545 N. Third St., Hamilton, Ohio
Greaves-Klusman Mach. Tool Co., 3120 Forrer St., Cincinnati, Ohio
Hendley Machine Co., 105 Summer St., Torrington, Conn.
LeBlond Machine Tool Co., R. K., Madison, and Edwards Rds., Cincinnati, Ohio
Lehmann Machine Co., St. Louis, Mo.
Lodge & Shipley Machine Tool Co., 3055 Colerain Ave., Cincinnati, Ohio
Monarch Machine Co., Sidney, Ohio
Pratt & Whitney, Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Niles Tool Works Co., Hamilton, Ohio
Reed-Prentice Co., 677 Cambridge St., Worcester Mass.
Rockford Machine Tool Co., Rockford, Ill.
Ryerson & Co., Inc., Jos T., 16th and Rockwell Sts., Chicago, Ill.
Seneca Falls Machine Co., Seneca Falls, N. Y.
Sidney Machine Tool Co., Sidney, Ohio
South Bend Lathe Works, South Bend, Ind.
Springfield Machine Tool Co., 631 W. Southern Ave., Springfield, Ohio
Wickes Bros., 512 N. Water St., Saginaw, Mich.

LATHES, Extension Bed and Gap
Cincinnati Lathe & Tool Co., Oakley, Cincinnati, Ohio
LeBlond Machine Tool Co., R. K., Madison and Edward Rds., Cincinnati, Ohio

LATHES, Gap
American Tool Works Co., Pearl and Eggelston Aves., Cincinnati, Ohio
Cincinnati Lathe & Tool Co., Oakley, Cincinnati, Ohio
General Machinery Corp., (Niles Tool Wks., Div.), 545 N. Third St., Hamilton, Ohio.
LeBlond Machine Tool Co., R. K., Madison and Edwards Rds., Cincinnati, Ohio
Lodge & Shipley Machine Tool Co., 3055 Colerain Ave., Cincinnati, Ohio
South Bend Lathe Works, South Bend, Ind.

LATHES, Horizontal Turret
Acme Machine Tool Co., 4955 Spring Grave Ave., Cincinnati, Ohio
Cincinnati Lathe & Tool Co., Oakley, Cincinnati, Ohio
Foster Machine Co., 1100 Beasley Ave., Elkhart, Ind.
Gisholt Machine Co., 1201 E. Washington Ave., Madison, Wis.
Goss & deLeeuw Machine Co., New Britain, Conn.
Hardinge Brothers, Inc., Elmira, N. Y.
International Machine Tool Co., Indianapolis, Ind.
Jones & Lamson Machine Co., Springfield, Vt.
Milholland Sales & Mach. Co., Indianapolis, Ind.
Potter & Johnston Machine Co., Pawtucket, R. I.
Springfield Machine Tool Co., 631 W. Southern Ave., Springfield, Ohio
Stark Tool Co., Waltham, Mass.
Warner & Swasey Co., The, 5701 Carnegie Ave., Cleveland, Ohio

LATHES, Monitor Brass
Dreses Machine Tool C., 3366 Beekman St., Cincinnati, Ohio
Bryant Machinery and Engrg. Co., 400 W. Madison St., Chicago, Ill.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio

LATHES, Oil Country
American Tool Works, Cincinnati, Ohio
Lodge & Shipley Machine Tool Co., 3055 Colerain Ave., Cincinnati, Ohio

LATHES, Portable
American Tool Works Co., Pearl and Eggelston Aves., Cincinnati, Ohio
LeBlonde Machine Tool Co., R. K., Madison and Edwards Rds., Cincinnati, Ohio
Lodge & Shipley Machine Tool Co., 3055 Colerain Ave., Cincinnati, Ohio
Monarch Machine Tool Co., Sidney, Ohio
Seneca Falls Machine Co., Seneca Falls, N. Y.
Springfield Machine Tool Co., 631 W. Southern Ave., Springfield, Ohio

LATHES SPINNING
Bliss Co., E. W., Brooklyn, N. Y.

LATHES, Thread Cutting
American Tool Works Co., Pearl & Eggelston Aves., Cincinnati, Ohio
Atlas Press Co., 1819 N. Pitcher St., Kalamazoo, Mich.
Automatic Machine Co., Bridgeport, Conn.
Bradford Machine Tool Co., 657 Evans St., Cincinnati, Ohio
Champion Blower and Forge Co., Harrisburg Ave., Lancaster, Pa.
Cincinnati Lathe & Tool Co., Oakley, Cincinnati, Ohio
Consolidated Machine Tool Corp., Rochester, N. Y.
Hardinge Brothers, Inc., Elmira, N. Y.
Hendey Machine Co., 105 Summer St., Torrington, Conn.
LeBlond Machine Tool Co., R. K., Madison and Edwards Rds., Cincinnati, Ohio
Lodge & Shipley Machine Tool Co., 3055 Colerain Ave., Cincinnati, Ohio
Monarch Machine Co., Sidney, Ohio
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Seneca Falls Machine Co., Seneca Falls, N. Y.
South Bend Lathe Works, South Bend, Ind.
Springfield Machine Tool Co., 631 W. Southern Ave., Springfield, Ohio
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio

LATHES, Toolroom
American Tool Works Co., Pearl and Eggelston Aves., Cincinnati, Ohio
Ames Co., B. C., Waltham, Mass.
Boye & Emmes Machine Tool Co., Cincinnati.
Bradford Machine Tool Co., 657 Evans St., Cincinnati, Ohio
Bryant Machinery & Engrg. Co., 400 W. Madison St., Chicago, Ill.
Cincinnati Lathe & Tool Co., Oakley, Cincinnati, Ohio
Hardinge Brothers, Inc., Elmira, N. Y.
Hendey Machine Co., 105 Summer St., Torrington, Conn.
LeBlonde Machine Tool Co., R. K., Madison and Edwards Rds., Cincinnati, Ohio
Lehmann Machine Co., St. Louis, Mo.
Lodge & Shipley Machine Tool Co., 3055 Coleraine Ave., Cincinnati, Ohio
Monarch Machine Co., The, Sidney, Ohio
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Rivett Lathe & Grinder Co., Inc., 20 Riverview Rd., Brighton, Boston, Mass.
Rockford Machine Tool Co., Rockford, Ill.
Seneca Falls Machine Co., Seneca Falls, N. Y.
Sidney Machine Tool Co., Sidney, Ohio
South Bend Lathe Works, South Bend, Ind.
Springfield Machine Tool Co., The, 631 W. Southern Ave., Springfield, Ohio
Stark Tool Co, Waltham, Mass.
Steege Machy Co., Chicago, Ill.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio.

LATHES, Vertical Turret
Bullard Co., Canfield Ave., Bridgenort, Conn.
General Machine Corp. (Niles Tool Works Div.), 545 Third St., Hamilton, Ohio
Goss & deLeeuw Machine Co., New Britain, Conn.
International Machine Tool Co., Indianapolis, Ind.,
Potter & Johnston Machine Co., Pawtucket, R. I.
Stark Tool Co., Waltham, Mass.

LATHES, Wheel Railroad
Cincinnati Lathe & Tool Co., Oakley, Cincinnati, Ohio
General Machine Corp. (Niles Tool Wks. Div.) 545 N. Third St., Hamilton, Ohio
Sellers & Co., Inc., William, 1600 Hamilton St., Philadelphia, Pa.

LAYOUT FLUID
Dayton Rogers Co., Minneapolis, Minn.
Dykem Co., The, 2301 N. Eleventh St., St. Louis, Mo.

LEADER PINS AND BUSHINGS
U. S. Tool Co., Inc., Ampere, N. J.

LEATHER, Hydraulic
Chicago Rawhide Mfg. Co., Chicago, Ill.
Elmes Engineering Wks., Chas F., 1001 Fulton St., Chicago, Ill.
Houghton & Co., E. F., Philadelphia, Pa.
Rhoads & Sons, J. E., 35 N. Sixth St., Philadelphia, Pa.

LEATHER, Polishing
Chicago Rawhide Mfg. Co., Chicago, Ill.
Rhoads & Sons, J. E., 35 N. Sixth St., Philadelphia, Pa.

LIFT TRUCK (See Trucks, Hand Lift)

LIGHTING EQUIPMENT
Benjamin Electric Mfg. Co., Des Plaines, Ill.

LOCK WASHERS
American Nut & Bolt Fastener Co., Pittsburgh, Pa.
Beall Tool Company, East Alton, Ill.
Butcher & Hart Mfg. Co., Toledo, Ohio
Eaton Mfg. Co., Massillon, Ohio
Hobbs Mfg. Co., Worcester, Mass.
National Lock Washer Company, Newark, N. J., and Milwaukee, Wis.
Philadelphia Steel & Wire Corp., Germantown, Phila., Pa.
Positive Lock Washer Co., Newark, N. J.
Washburn Company, Worcester, Mass.

LOCKERS
Berger Mfg. Co. (Sub. of Republic Steel Corp.), Canton, Ohio
Lyon Metal Products Co., Aurora, Ill.

LUBRICANTS
Dixon Crucible Co., Jos. Jersey City, N. J.
Greene, Tweed & Co., 109 Duane St., New York, N. Y.
Gulf Refining Co., Gulf Bldg., Pittsburgh
Houghton & Co., E. F., Philadelphia, Pa.
Mico Instrument Co., 10 Arrow St., Cambridge, Mass.
Socony-Vacuum Oil Co., New York, N. Y.
Standard Oil Co. of Indiana, Chicago, Ill.
Stewart-Warner Corp., Alemite Div. Chicago, Ill.
Stuart & Co., D. A., 2727 S. Troy St., Chicago, Ill.
Texas Company, 135 E. 42nd St., New York
Tidewater Associated Oil Co., 17 Battery Place, N. Y.

LUBRICATING SYSTEMS
Bijur Lubricating Corp., 2212 43rd Ave., Long Island City, N. Y.
Bowen Products Corp., 2760 W. Warren Ave., Detroit, Mich.
De Laval Separator Co., 165 Broadway, N. Y.
Gits Bros. Mfg. Co., 1846 E. Kilbourn Ave., Chicago, Ill.
Madison-Kipp Corp., Madison, Wis.
Rivett Lathe & Grinder Co. Inc., 20 Riverview Rd., Brighton, Boston, Mass.
Speedway Mfg. Co., 1834 S. 52nd Ave., Cicero, Ill.
Stewart-Warner Corp., Alemite Div. Chicago, Ill.

MACHINE LAMPS
Fostoria Pressed Steel Corp., Fostoria, Ohio
McCrosky Tool Corp., 1340 South Main St., Meadville, Pa.

MACHINISTS' SMALL TOOLS (see Calipers, Hammers, Wrenches, Drills, Taps, etc.)

MAGNET
Brown & Sharpe Mfg. Co., Providence, R. I.
Electric Controller & Mfg. Co., 2700 E. 79th St., Cleveland, Ohio
Stearns Magnetic Mfg. Co., Milwaukee, Wis.

MANDRELS, Expanding
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio
Hannifin Mfg. Co., 621 S. Kolmar Ave., Chicago, Ill.
Morse Twist Drill & Machine Co., 163 Pleasant St., New Bedford, Mass.
Nicholson & Co., W. H., 114 Oregon St., Wilkes-Barre, Pa.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Tomkins-Johnson Co., 615 N. Mechanic St., Jackson, Mich.
Western Tool & Mfg. Co., Springfield, Ohio

MANDRELS, Solid
Atkins, E. C. and Co., 402 S. Illinois St., Indianapolis, Ind.
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio
Disston & Sons, Inc., Henry, Tacony, Philadelphia, Pa.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Standard Tool Co., The, 6918 Central Ave., Cleveland, Ohio
Super Tool Company, 356 E. Congress St., Detroit, Mich.
Union Twist Drill Co., Athol, Mass.
Universal Engineering Co., Frankenmuth, Mich.

MANDRELS, Solid Cemented Carbide
Carboloy Co., Inc., 2989 E. Jefferson Ave., Detroit, Mich.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.

MARKING MACHINES
Electro-Graphic Graver Co., Factories Bldg., Toledo, Ohio
Noble & Westbrook Mfg. Co., 20 Westbrook St., East Hartford, Conn.
Preis Engraving Machine Co., H. P., Newark, N. J.

MATERIAL HANDLING
Ready-Power Co., Detroit, Mich.

MEASURING MACHINES
Jones & Lamson Machine Co., Springfield, Vt.
Mico Instrument Co., 10 Arrow St., Cambridge, Mass.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Scherr Co., Inc., George, 128 Lafayette St., New York
Sheffield Gage Corp., Dayton, Ohio
Van Keuren Co., The, 112 Copeland St., Watertown, Mass.

MECHANICS HAND TOOLS
American Swiss File & Tool Co., Elizabeth, N. J.
Niagara Machine & Tool Wks., Buffalo N. Y.
Starrett Co., The L. S., Cresent St., Athol, Mass.

MERCURY SWITCHES
General Electric Vapor Lamp Co., Hoboken, N. J.
Hart Mfg. Co., Hartford, Conn.
Jefferson Electric Co., Bellwood, Ill.

MERCURY VAPOR LAMPS
General Electric Vapor Lamp Co., Hoboken, N. J.

METAL, Perforated
Wickwire Spencer Steel Co., New York City.

MICROMETER, Internal
Bath & Co., Inc., John, 18 Grafton St., Worcester, Mass.
Federal Products Corp., 1144 Eddy St., Providence R. I.
Lufkin Rule Co., Saginaw, Mich.
Randall & Stickney, Waltham, Mass.
Starrett Co., The, L. S., Crescent St., Athol, Mass.
Swedish Gage Co. of America, 7310 Woodward Ave., Detroit, Mich.

MICROMETER PLUG GAGES
Bath & Co., Inc., John, 18 Grafton St., Worcester, Mass.
Sheffield Gage Corp., Dayton, Ohio
Standard Gage Co., Inc., Poughkeepsie, N. Y.
Taft-Peirce Mfg. Co., The, 32 Mechanic Ave., Woonsocket, R. I.

MICROMETERS
Brown & Sharpe Mfg. Co., Providence, R. I.
Federal Products Corp., 1144 Eddy St., Providence, R. I.
Lufkin Rule Co., Saginaw, Mich.
Manheim Co., Inc., K., 15 E. 26th St., New York
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
George Scherr Co. Inc., 128 Lafayette St., New York
Starrett Co., The, L. S., Crescent St., Athol, Mass.
Swedish Gage Co. of America, 7310 Woodward Ave., Detroit, Mich.
Van Keuren Co., The, 12 Copeland St., Watertown, Mass.

MICROSCOPES
Bausch & Lomb Optical Co., Rochester, N.Y.
Leitz, Inc., E., New York, N. Y.

MILLING AND CENTERING MACHINES,
Jones & Lamson Machine Co., Springfield, Vt.

MILLING ATTACHMENTS
Adams Co., East Fourth St., Dubuque, Ia.
Bridgeport Pattern and Model Works, Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Lathe & Tool Co., Oakley, Cincinnati, Ohio
Cincinnati Milling Machine Co., Cincinnati, Ohio
DeVlieg Milling Machine Co., Jachson, Mich.
Ingersoll-Rand Co., 11 Broadway, New York.
Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee, Wis.
Kingsbury Machine Tool Co., Keene, N. H.
Porter-Cable Machine Co., 1725 N. Salina St., Syracuse, N. Y.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Stark Tool Co., Waltham Mass.
Stokerunit Corp., 4548 W. Mitchell St., Milwaukee, Wis.
Van Norman Machine Tool Co., Springfield, Mass.

MILLING CUTTERS (see Cutters Milling)

MILLING MACHINE DRIVES
Chicago Rawhide Mfg. Co., Chicago, Ill.
Cleveland Elec. Motor Co., 5213 Chester Ave., Cleveland, Ohio
Cullman Wheel Co., Chicago, Ill.
DeVlieg Milling Machine Co., Jackson, Mich.
Hardinge Brothers, Inc., Elmira, N. Y.
Ingersoll Milling Machine Co., Rockford, Ill.

MILLING MACHINES, Automatic
American Machine Tool Co., Hackettstown, N. J.
Automatic Machine Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Machine Co., Cincinnati, Ohio
Consolidated Machine Tool Corp., Rochester, N. Y.
DeVlieg Milling Machine Co., Jackson, Mich.
Ingersoll Milling Machine Co., Rockford, Ill.
Kearney & Trecker Corp., Milwaukee, Wis.
Potter & Johnston Machine Co., Pawtucket, R. I.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Sundstrand Machine Tool Co., Rockford, Ill.
U. S. Tool Co., Inc., Ampere, N. J.

MILLING MACHINES, Bench
Ames Co., B. C., Waltham, Mass.
Hardinge Brothers, Inc., Elmira, N. Y.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Stark Tool Co., Waltham, Mass.

MILLING MACHINES, Continuous
Consolidated Machine Tool Corp., Rochester, N. Y.
Davis & Thompson Co., 6619 West Mitchell St., Milwaukee, Wis.
Fitchburg Engrg. Corp., 52 Oak Hill Road, Fitchburg, Mass.
General Machinery Corp. (Niles Tool Wks. Div.), 545 N. Third St., Hamilton Ohio
Ingersoll Milling Machine Co., Rockford, Ill.
Kearney & Trecker Corp., Milwaukee, Wis.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Sunstrand Machine Tool Co., Rockford, Ill.

MILLING MACHINES, Duplex
Cincinnati Milling Machine Co., Cincinnati.
Cochrane-Bly Co., 15 St. James Pl., Rochester, N. Y.
Consolidated Machine Tool Corp., Rochester, N. Y.
Davis & Thompson Co., 6619 West Mitchell St., Milwaukee, Wis.
Defiance Machine Works, Defiance, Ohio
DeVlieg Milling Machine Co., Jackson, Mich.
Fitchburg Engrg. Corp., 52 Oak Hill Road, Fitchburg, Mass.
General Machinery Corp. (Niles Tool Wks. Div.), 545 N. Third St., Hamilton, Ohio
Ingersoll Milling Machine Co., Rockford, Ill.
Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee, Wis.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Sundstrand Machine Tool Co., Rockford, Ill.
Taylor & Fenn Co., The, 54 Arch St., Hartford, Conn.

MILLING MACHINES, Floor Type
Consolidated Machine Tool Corp., Rochester, N. Y.
DeVlieg Milling Machine Co., Jackson, Mich.
Fitchburg Engrg. Corp., 52 Oak Hill Road, Fitchburg, Mass.
General Machinery Corp. (Niles Tool Wks. Div.), 545 N. Third St., Hamilton, Ohio
Giddings & Lewis Machine Tool Co., 142 Doty St., Fond du Lac, Wis.
Ingersoll Milling Machine Co., Rockford, Ill.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Sellers & Co., Inc., William, 1600 Hamilton St., Philadelphia, Pa.
Stokerunit Corp., 4548 W. Mitchell St., Milwaukee, Wis.

MILLING MACHINES, Hand
Brown & Sharpe Mfg. Co., Providence, R. I.
Frew Machine Co., 126 W. Venango St., Philadelphia, Pa.
Kent-Owens Machine Co., Toledo, O.
Nichols, W. H., Waltham, Mass.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Sundstrand Machine Tool Co., Rockford, Ill.
Van Norman Machine Tool Co., Springfield, Mass.

MILLING MACHINES, Plain
Cincinnati Milling Machine Co., Cincinnati, Ohio
DeVlieg Milling Machine Co., Jackson, Mich.
Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee, Wis.
Kent-Owens Machine Co., Toledo, Ohio
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Sidney Machine Tool Co., Sidney, Ohio
Steege Machy Co., Chicago, Ill.

MILLING MACHINES, Planer Type
Cincinnati Planer Co., 3120 Forrer St., Oakley, Cincinnati, Ohio
Consolidated Machine Tool Corp., Rochester, N. Y.
Fitchburg Engrg. Corp., 52 Oak Hill Road, Fitchburg, Mass.
General Machinery Corp. (Niles Tool Wks. Div.), 545 North Third St., Hamilton, Ohio
Giddings & Lewis Machine Tool Co., 142 Doty Street, Fond du Lac, Wis.
Gray Co., The, G. A., 3611 Woodburn Ave., Cincinnati, Ohio
Ingersoll Milling Machine Co., Rockford, Ill.
Kearney & Trecker Corp., Milwaukee, Wis.
Sellers & Co., Inc., William, 1600 Hamilton St., Philadelphia, Pa.
Stokerunit Corp., 4548 W. Mitchell St., Milwaukee, Wis.

MILLING MACHINES, Profile
Automatic Machine Company, Bridgeport, Conn.
Consolidated Machine Tool Corp., Rochester, N. Y.
Frew Machine Co., 126 West Venango St., Philadelphia, Pa.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.

MILLING MACHINES, Thread
Adams Company, East Fourth St., Dubuque, Iowa
Automatic Machine Company, Bridgeport, Conn.
Grob Bros., West Allis, Wis.
Hall Planetary Co., Fox Street, Philadelphia
Hanson-Whitney Machine Co., 169 Bartholomew Ave., Hartford, Conn.
Lees-Bradner Co., 6210 Carnegie Ave., Cleveland, Ohio.
Marburg Brothers, Inc., 90 West St., New York, N. Y.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Rivett Lathe & Grinder Co., Inc., 20 Riverview Rd., Brighton, Boston, Mass.
Scherr Co., Inc., Geo., 128 Lafayette St., New York, N. Y.
Taft-Pierce Mfg. Co., The, 32 Mechanic Ave., Woonsocket R. I.
Waltham Machine Works, Waltham, Mass.

MILLING MACHINES, Universal
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Machine Co., Cincinnati, Ohio
Cochrane-Bly Co., 15 St. James St., Rochester, N. Y.
Gorton Machine Co., George, 1103 13th St., Racine, Wis.
Kearney & Trecker Corp., 6784 West National Ave., Milwaukee, Wis.
Knight Machinery Co., W. B., 3620 W. Pine Blvd., St. Louis, Mo.
Ryerson & Co., Inc., Jos. T. 16th and Rockwell Sts., Chicago, Ill.
Sidney Machine Tool Co., Sidney, Ohio
Steege Machy. Co., Chicago, Ill.
Van Norman Machine Tool Co., 160 Wilbraham Ave., Springfield, Mass.

MILLING MACHINES, Vertical
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Machine Co., Cincinnati
Clough, R. M., Meriden, Conn.
Cochrane-Bly Co., 15 St. James Place, Rochester, N. Y.
Consolidated Machine Tool Corp., Rochester, N. Y.
General Machinery Corp. (Niles Tool Wks. Div.), 545 North Third St., Hamilton, Ohio
Gorton Machine Co., George, 1103 13th St., Racine, Wis.
Index Machinery Corp., 49 Central Ave., Cincinnati, Ohio
Ingersoll Milling Machine Co., Rockford, Ill.
Kearney & Trecker Corp., 6784 West National Ave., Milwaukee, Wis.
Knight Machinery Co., W. B. 3920 West Pine Blvd., St. Louis, Mo.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Reed-Prentice Co., 677 Cambridge St., Worcester, Mass.
Sidney Machine Tool Co., Sidney, Ohio
Stark Tool Co., Waltham, Mass.
Sundstrand Machine Tool Co., Rockford, Ill.
Taylor & Fenn Co., The, 54 Arch St., Hartford Conn.

MILLING UNITS, Self-Contained Motor Drive
Barnes, W. F. & John, Rockford, Ill.
DeVlieg Milling Machine Co., Jackson, Mich.
Fitchburg Engrg. Corp. 52 Oak Hill Road, Fitchburg, Mass.
Foote-Burt Co., The, 13000 St., Clair Ave., Cleveland Ohio.
Greenlee Bros. & Co., Twelfth Street and Columbia Ave., Rockford, Ill.
Ingersoll Milling Machine Co., Rockford, Ill.
National Automatic Tool Co., South 7th and N Sts., Richmond, Ind.
Sellers & Co., Inc., William, 1600 Hamilton St. Philadelphia, Pa.

MILLS, Hollow (see Cutters, Milling)

MOLDERS BENCHERS AND VIBRATORS
Western Tool and Mfg. Co., Springfield, Ohio

MOLDING MATERIALS, Phenolic
Bakelite Corp., Bound Brook, N. J.
Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.

MOLDING MACHINES
Osborn Mfg Co., 5401 Hamilton Ave., Cleveland, Ohio

MOLYBDENUM
Climax Molybdenum Corp., 500 5th Ave., N. Y. C.

MONORAIL (see Tramrail)

MORTISING CHAIN
Boston Gear Works, Inc., North Quincy, Ill.

MOTOR GENERATORS
General Electric Co., Schenectady, N. Y.
Jeanette Mfg. Co., 556 W. Monroe St., Chicago
Westinghouse Elec and Mfg. Co., East Pittsburg, Pa.

MOTORS, Electric
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Baldor Electric Co., 4357 Duncan Ave., St. Louis Mo.
Bodine Electric Co., 2264 W. Ohio St., Chicago
Century Electric Co., St. Louis, Mo.
Cleveland Elec. Motor Co., 5213 Chester Ave., Cleveland, Ohio
Dunmore Co., The, 14th St., Racine, Wis.
Emerson Electric Mfg. Co., 2001 Washington Ave., St. Louis, Mo.
Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago Ill.
Forbes & Myers, 170 Union St., Worcester, Mass.
General Electric Co., Schenectady, N. Y.
Janette Mfg. Co., 556 W. Monroe St., Chicago, Ill.
Lincoln Electric Co., Cleveland, Ohio
Marathon Elec. Mfg. Corp., Wausau, Wis.
Reliance Elec. and Engrg. Co., 1058 Idaho Road, Cleveland, Ohio
Speedway Mfg. Co., 1834 So. 52nd Ave., Cicero, Ill.
Sterling Electric Motors, Telegraph Road, Los Angeles, Calif.
Wagner Electric Corp., 6444 Plymouth Ave., St. Louis, Mo.
Westinghouse Elec. & Mfg. Co., East Pittsburg, Pa.

MUFFLE FURNACES, High Speed
Stark Tool Co., Waltham, Mass.
Surface Combustion Corp., Toledo, Ohio

MULTI-SLIDE MACHINES
U. S. Tool Co., Inc., Ampere, N. J.

NAILS, Foundry
Pittsburgh Steel Co., Union Trust Bldg., Pittsburgh, Pa.

NAMEPLATES
Crowe Name Plate & Mfg. Co., 1749 Grace St., Chicago, Ill.

NIBBLING MACHINES
Andrew C. Campbell Division (Amer. Chaim & Cable Co., Inc.), 929 Bridgeport, Conn.
Mitts & Merrill, 913 Tilden St., Saginaw, Mich.
Savage Co., W. J. Clinch Ave., and Tenth St., Knoxville, Tenn.

NICKEL
Driver-Harris Co., Harrison, N. J.

NITROGEN
Air Reduction Sales Company, 60 East 42nd St. New York, N. Y.
Linde Air Products Co., 30 E. 42nd St., New York City

NOZZLES, Blast Cleaning
American Foundry Equipment Co., Mishawaka, Ind.
Binks Mfg. Co., 3114 Carroll Ave., Chicago
Norton Company, Worcester, Mass.

NOZZLES, Spray
Link-Belts Co., 307 N. Michigan Ave., Chicago

NUMBERING MACHINES
Noble & Westbrook Mfg. Co., 20 Westbrook St., East Hartford, Conn.

NUT BLANKING MACHINES
National Machinery Co., Tiffin, Ohio
Potter & Johnston Machine Co., Pawtucket, R. I.
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.
Windsor Automatic Co., Inc., Depot Ave., Windsor, Vt.

NUT SETTING EQUIPMENT
Baush Machine Tool Co., 156 Wason Ave., Springfield, Mass.
Black & Decker Mfg. Co., 716 Pennsylvania Ave., Towson, Md.
Buckeye Portable Co., 29 West Apple St., Dayton, Ohio
Chicago Pneumatic Tool Co., 6 East 44th St., New York, N. Y.
Clark Jr., Elec. Co., James, 600 Bergman St., Louisville, Ky.
Cross Gear & Machine Co., 3250 Bellevde, Detroit, Mich.
Errington Mechanical Laboratory, 24 Norwood Ave., Stapleton, Staten Island, N. Y.
Independent Pneumatic Tool Co., Chicago, Ill.
Ingersoll-Rand Co., 11 Broadway, New York
Strand Co., N. A. 5001 No. Lincoln St., Chicago, Ill.
Tomkins-Johnson Co., The, 615 N. Mechanic St., Jackson, Mich.
Van Dorn Electric Tool Co., 716 Joppa Road, Towson, Md.

NUT TAPPERS (See Bolt and Nut Machinery)
National Acme Co., Cleveland, Ohio
National Machinery Co., Tiffin, Ohio

OIL AND GREASE CUPS
Bowen Products Corp., 2760 W. Warren Ave., Detroit, Mich.
Gits Bros. Mfg. Co., 1846 So. Kilbourn Ave., Chicago, Ill.
Stewart Warner Corp., Alemite Div., Chicago

OIL GROOVING ATTACHMENTS
Hansom-Whitney Machine Co., 169 Bartholomew Ave., Hartford, Conn.
National Machine Tool Co., 2272 Spring Grove Ave., Cincinnati, Ohio

OIL GROOVING MACHINES
Defiance Machine Works, Defiance, Ohio
Fischer Machine Co., 310 N. 11th St., Philadelphia, Pa.
Wicaco Machine Corp., Stenton Ave., Philadelphia, Pa.

OIL SEALS
Chicago Rawhide Mfg. Co., Chicago, Ill.
Felters Co. Inc., South St., Boston, Mass.
Gits Bros. Mfg. Co., 1846 So. Kilbourn Ave., Chicago, Ill.
National Motor Bearings Co., 1100 78th Ave., Oakland, Calif.

OILERS, Automatic
Bowen Products Corp., 7260 W. Warren Ave., Detroit, Mich.
Gits Bros. Mfg. Co., 1846 So. Kilbourn Ave., Chicago, Ill.
Rivett Lathe & Grinder Inc., Brighton, Boston, Mass.
Speedway Mfg. Co., 1834 So, 52d Ave., Cicero, Ill.
Stewart-Warner Corp., Alemite Div., Chicago

OILS, Cutting
Gulf Refining Co., Gulf Bldg., Pittsburgh, Pa.
Houghton & Co., E. F., Philadelphia, Pa.
Oster Mfg. Co., The, 2057 East 61st Place, Cleveland, Ohio
Racine Tool & Machine Co., 1751 State St., Racine, Wis.
Socony-Vacuum Oil Co., New York, N. Y.
Stuart Oil Co., D. A., 2727 So. Troy St., Chicago, Ill.
Sulflo Corp. of America, 701 Spring St., Elizabeth, N. J.
Sun Oil Co., Philadelphia, Pa.
Texas Co., 135 E. 42nd St., New York
Tidewater Associated Oil Co., 17 Battery Place, N. Y.

OILS, Lubricating
Gulf Refining Co., Gulf Bldg., Pittsburgh, Pa.
Houghton & Co., E. F., Philadelphia, Pa.
Mico Instrument Co., 10 Arrow St., Cambridge, Mass.
Socony-Vacuum Oil Co., New York, N. Y.
Standard Oil Co. of Indiana, 910 S. Michigan Ave., Chicago, Ill.
Stewart-Warner Corp., Alemite Div., Chicago
Stuart Oil Co., D. A., 2727 So. Troy St., Chicago, Ill.
Sun Oil Co., Philadelphia, Pa.
Texas Co., 135 E. 42nd St., New York
Tidewater Oil Co., 17 Battery Place, N. Y.

OILS, Quenching and Tempering
Gulf Refining Co., Gulf Bldg., Pittsburgh, Pa.
Houghton & Co., E. F., Philadelphia, Pa.
Socony-Vacuum Oil Co., New York, N. Y.
Standard Oil Co. of Indiana, 910 S. Michigan Ave., Chicago, Ill.
Stuart Oil Co., D. A., 2727 So. Troy St., Chicago, Ill.
Sun Oil Co., Philadelphia, Pa.
Texas Co., 135 E. 42nd St., New York

OPTICAL INSPECTION AND GAGING MACHINES (Comparator)
Jones & Lamson Machine Co., Springfield, Vt.
George Scherr Co., Inc., 128 Lafayette St., New York
Mico Instrument Co., 10 Arrow St., Cambridge, Mass.
Van Keuren Co., 12 Copeland St., Watertown, Mass.

OPTICAL PROTRACTORS
Scherr Co., Inc., Geo., 128 Lafayette St., New York, N. Y.

OXYGEN
Air Reduction Sales Company, 60 East 42nd St., New York, N. Y.
Linde Air Products Co., 30 E. 42nd St., N. Y. C.

PACKING, Asbestos, Cotton, Felt, Pumps, etc.
Felters Co., Inc., 210 South St., Boston, Mass.
Greene, Tweed & Co., 109 Duane St., New York, N. Y.
Republic Rubber Co., Youngstown, Ohio

PACKING, Hydraulic
Chicago Rawhide Mfg. Co., Chicago, Ill.
Elmes Engineering Wks., Chas. F., 1001 Fulton St., Chicago, Ill.
B. F. Goodrich Co., 576 South Main St., Akron, Ohio
Graton & Knight Co., 356 Franklin St., Worcester, Mass.
Greene, Tweed & Co., 109 Duane St., New York, N. Y.

PACKING—(Cont.)
Houghton & Co., E. F., Philadelphia, Pa.
Hydraulic Press Mfg. Co., Mt. Gilead, Ohio
Keckly, C. O., 567 Washington Blvd., Chicago Ill.
Rhoads & Sons, J. E., 35 North Sixth St., Philadelphia, Pa.
Watson-Stillman Co., Roselle, N. J.

PAINTING EQUIPMENT, Spray
Binks Mfg. Co., 3114 Carroll Av.., Chicago
De Vilbiss Co., Toledo, Ohio
Ideal Commutator Dresser Co., Sycamore, Ill.

PAINTS, Acid and Alkali Resistant
American Coppercote Inc., 480 Lexington Ave., New York
Bakelite Corp., Bound Brook, N. J.
Goodrich Co., B. F., 576 South Main St., Akron, Ohio
Houghton & Co., E. F., Philadelphia, Pa.
Maas & Walstein, Newark, N. J.
Socony-Vacuum Oil Co., New York, N. Y.

PARALLELS
Brown & Sharpe Mfg. Co., Providence, R. I.
Ford Motor Co., Johansson Div., 3674 Schaefer Rd., Dearborn, Mich.
Starrett Co., The L. S., Crescent St., Athol, Mass.
Taft-Peirce Mfg. Co., The, 32 Mechanic Ave., Woonsocket, R. I.
Vinco Tool Co., 7350 Central Ave., Detroit
Walker & Co., Inc., O. S., Worcester, Mass.

PERFORATING DIES, Adjustable
Whistler & Sons, S. B., Inc., 752 Military Rd., Buffalo, N. Y.

PHOSPHOR BRONZE (see Alloys, Phosphor Bronze)

PICKLING MACHINES
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.

PILLOW BLOCKS
Ahlberg Bearing Co., 317 E. 29th St., Chicago, Ill.
Boston Gear Works, Inc., North Quincy, Mass.
Dodge Mfg. Corp., Mishawaka, Ind.
Earle Gear & Mach. Co., 4707 Stenton Ave., Philadelphia, Pa.
Fafnir Bearing Co., New Britain, Conn.
Hanson Clutch & Machinery Co., Tiffin, Ohio
Link-Belt Co., 307 N. Michigan Ave., Chicago
Norma-Hoffman Bearings Corp., Stamford, Conn.
Palmer-Bee Co., Westminister & G. T. R. R., Detroit, Mich.
S. K. F. Industries, Inc., Philadelphia, Pa.
Savage Co., W. J., Clinch Ave. and Tenth St., Knoxville, Tenn.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.
Smith, Inc., Winfield H., Springville, Erie County, N. Y.

PINIONS (see Gears)

PIPE, Acid Resisting Non-Metallic
Continental Diamond Fibre Co., Newark, Del.

PIPE, Brass and Copper
American Brass Co., Waterbury, Conn.
Revere Copper & Brass Corp., 230 Park Ave., New York, N. Y.
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.

PIPE CUTTERS, Hand
Ridge Tool Co., Elyria, Ohio

PIPE CUTTING AND THREADING MACHINES
Beaver Pipe Tools Inc., 1937 Amma Ave., Warren, Ohio
Landis Machine Co., Inc., Church and 5th Sts., Waynesboro, Pa.
Merrell Mfg. Co., 100 Curtis St., Toledo, Ohio
Murchey Machine & Tool Co., 951 Porter St., Detroit, Mich.
Oster Mfg. Co., The, 2057 E. 61st Pl., Cleveland
Peerless Machine Co., 1615 Racine St., Racine, Wis.
Pipe Machinery Co., The, 930 E. 70th St., Cleveland, Ohio
Ryerson & Co, Inc., Jos. T., 16th and Rockford, Sts., Chicago, Ill.
Toledo Pipe Threading Machine Co., 1445 Summit St., Toledo, Ohio
United Engrg. & Fdry. Co., Pittsburgh, Pa.

PIPE FITTERS' TOOLS
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Beaver Pipe Tools Inc., 1937 Amma Ave., Warren, Ohio
Greenfield Tap & Die Corp., Sanderson St., Greenfield, Mass.

PIPE PLUGS
Hydraulic Press Mfg. Co., Mt. Gilead, Ohio
Strong Carlisle & Hammond Co., 1392 W. Third St., Cleveland, Ohio

PIPE PLUGS, Socket
Allen Mfg. Co., Hartford, Conn.
Bristol Co., Waterbury, Conn.
Holo-Krome Screw Corp., The, Bristol, Conn.
Standard Pressed Steel Co., Jenkintown, Pa.

PIPE STEEL
Bethlehem Steel Co., Bethlehem, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
National Tube Co., 1802 Frick Bldg., Pittsburgh, Pa.
Pittsburgh Steel Co., Union Trust Bldg., Pittsburgh, Pa.
Republic Steel Corp., Republic Bldg., Cleveland, Ohio

PLANER ATTACHMENT
Adams Company, E. 4th St., Dubuque, Iowa
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Cincinnati Planer Co., 3120 Forrer St., Oakley, Cincinnati, Ohio
Gray Co., The, G. A., 3611 Woodburn Ave., Cincinnati, Ohio
Ingersoll Milling Machine Co., Rockford, Ill.
Reed-Prentice Co., 677 Cambridge St., Worcester, Mass.

PLANERS, Open Side
Automatic Machine Company, Bridgeport, Conn.
Cincinnati, Planer Co., 3120 Forrer St., Oakley, Cincinnati, Ohio
Cleveland Planer Co., 3148 Superior Ave., Cleveland, Ohio
General Machinery Corp., (Niles Tool Wks. Div.), 545 N. Third St., Hamilton, Ohio
Gray Co., G. A. The, 3611 Woodburn Ave., Cincinnati, Ohio
Rockford Machine Tool Co., Rockford, Ill.
Sellers & Co., Inc., William 1600 Hamilton St., Philadelphia, Pa.

PLANERS, Switch and Frog
Cincinnati, Planer Co., 3120 Forrer St., Cincinnati, Ohio
Consolidated Machine Tool Corp., Rochester, N. Y.
General Machinery Corp., (Niles Tool Wks. Div.), 545 N. Third St., Hamilton, Ohio
Gray Co., G. A. The, 3611 Woodburn Ave., Cincinnati, Ohio
Sellers & Co., Inc., William 1600 Hamilton St., Philadelphia, Pa.

PLANING MACHINES
Bryant Machinery & Engrg. Co., 400 W. Madison St., Chicago, Ill.
Cincinnati Planer Co., 3120 Forrer St., Oakley, Cincinnati, Ohio
Cleveland Punch & Shear Works Co., E. 40th and Saint Clair Ave., Cleveland, Ohio
Consolidated Machine Tool Corp., Rochester, N. Y.
General Machinery Corp. (Niles Tool Wks. Div.), 545 N. Third St., Hamilton, Ohio
Gray Co, G A., The, 3611 Woodburn Ave., Cincinnati, Ohio
Niles Tool Works Co., Hamilton, Ohio
Ohio Machine Tool Co., Kenton, Ohio
Rockford Machine Tool Co., Kishwaukee St., Rockford, Ill.
Sellers & Co., Inc., William, 1600 Hamilton St., Philadelphia, Pa.

PLASTIC PRODUCTS
Bakelite Corp., Bound Brook, N. J.
Colts Patent Fire Arms Mfg. Co., 17 Van Dyke Ave., Hartford, Conn.
Continental Diamond Fibre Co., Newark, Del.
Cutler Hammer Inc., Milwaukee, Wis.
Formica Insulation Co., 4614 Spring Grove Ave., Cincinnati Ohio
General Plastics Inc., North Tonawanda, N. Y.
Synthane Corp. Oaks, Pa.

PLATE PLANERS
Baldwin-Southwark Corp., Paschall P. O. Station, Philadelphia, Pa.
Cleveland Punch & Shear Works Co., 3917 St. Clair Ave., Cleveland, O.
General Machinery Corp. (Niles Tool Wks. Div.), 545 Third St., Hamilton, Ohio.
Sellers & Co., Inc., William, 1600 Hamilton St., Philadelphia, Pa.
Williams, White & Co. Moline, Ill.

PLATES, Floor
Carnegie-Illinois Steel Corp., Pittsburg, Pa.
Ryerson & Co., Inc., Jos., T., 16th and Rockwell Sts., Chicago, Ill.
Sellers & Co., Inc., William, 1600 Hamilton St., Philadelphia, Pa.

PLATES, Steel
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburg, Pa.
Jones & Laughlin Steel Corp., Pittsburg, Pa.
Republic Steel Corp., Republic Bldg., Cleveland, Ohio
Ryerson & Co., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Universal Steel Co., Bridgeville, Pa.

PLATFORMS, Skid
All Steel Welded Truck Corp., 1145 Railroad Ave., Rockford, Ill.
Automatic Transportation Co., 59 W. 87th St., Chicago, Ill.
Barrett-Cravens Co., 3255 W. 30th St., Chicago, Ill.
Powell Pressed Steel Co., Hubbard, Ohio
Standard Pressed Steel Co., Jenkintown, Pa.
Yale & Towne Mfg. Co., Philadelphia, Div., 4530 Tacony St., Philadelphia, Pa.
Easton Car & Construction Co., Easton, Pa.

PLATING, Chromium
Pratt & Whitney, Div. Niles-Bement- Pond Co., 436 Capitol Ave., Hartford, Conn.

PLATING EQUIPMENT
Crown Rheostat & Supply Co., Chicago, Ill.
Hanson, Van Winkle & Munning Co., Matawan, N. J.

POINTS, Center
Ford Motor Co., Johansson Div., 3674 Schaefer Rd., Dearborn, Mich.

POLISHING AND BUFFING MACHINES
Bridgeport Safety Emery Wheel Co., Inc., Bridgeport, Conn.
Cleveland Elec. Motor Co., 5213 Chester Ave., Cleveland, Ohio
Gardner Machine Co., 410 E. Gardner St., Beloit, Wis.
Hisey-Wolf Machine Co., The, Marshall and Colerain Aves., Cincinnati, Ohio
Mall Tool Co., 7740 S. Chicago Ave., Chicago, Ill.
Marathon Elec. Mfg. Corp., Wausau, Wis.
Mattison Machine Works, Rockford, Ill.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Landis Tool Co., Waynesboro, Pa.
Parker Machine Co., Chas., Meriden, Conn.
Production Machine Co., Greenfield, Mass.
Standard Electrical Tool Co., 1940 W. 8th St., Cincinnati, Ohio
Swartz & White Mfg. Co., 25 Washington St., Binghamton, N. Y.

POLISHING AND BUFFING MACHINES, Portable
Black & Decker Mfg. Co., Towson, Md.
Buckeye Portable Tool Co., 29 W. Apple St., Dayton, Ohio
Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y.
Haskins Co., R. G., 4630 W. Fulton St., Chicago, Ill.
Hisey-Wolf Machine Co., The, Marshall and Colerain Aves., Cincinnati, Ohio
Independent Pneumatic Tool Co., Chicago, Ill.
Ingersoll–Rand Co., 11 Broadway, New York
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Standard Electrical Tool Co., 1940 W. 8th St., Cincinnati, Ohio
Strand Co., N. A., 5001 No. Lincoln St., Chicago, Ill.
Stanley Elec. Tool. Div. of Stanley Works, New Britain, Conn.
United States Electrical Tool Co., 2488 W. 6th St., Cincinnati, Ohio

POLISHING COMPOUNDS
Carborundum Co., Niagara Falls, N. Y.
Socony-Vacuum Oil Co., New York, N. Y.

POLISHING GRAINS, Abrasive
Carborundum Co., Niagara Falls, N. Y.
Norton Co., Worcester, Mass.

PORTABLE TOOLS (See Portable Drilling and Grinding Machines, Etc.)

PORTABLE TOOLS, Electric
Chicago Wheel & Mfg. Co., 1101 W. Monroe St., Chicago, Ill.

POTS, Glue
Francis Co., Chas. E., Rushville, Ind.

POTS, Melting
Driver-Harris Co., Harrison, N. J.
Strong, Carlisle & Hammond Mach. Co., Cleveland, Ohio

PRESS BRAKES
Cincinnati Shaper Co., Cincinnati, Ohio
Cleveland Punch & Shear Works Co., E. 40th and St. Clair Ave., Cleveland, Ohio
Columbia Machine Tool Co., 1790 Fairgrove Ave., Hamilton, Ohio
Dreis & Krump Mfg. Co., 7406 Loomis Blvd., Chicago, Ill.
Henderson Machine Co., 5023 Germantown Ave., Philadelphia, Pa.
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Strippit Corp., 1559 Niagara St., Buffalo, N. Y.
United Engrg. & Fdry. Co., Pittsburgh, Pa.
Whitney Metal Tool Co., Rockford, Ill.

PRESS FEEDS
Bliss E. W., Co., Brooklyn, N. Y.
Federal Press Co., Elkhart, Ind.
Henderson Machine Co., 5023 Germantown Ave., Philadelphia, Pa.
Henry & Wright Mfg. Co., 760 Windsor St., Hartford, Conn.
Littell Machine Co., F. J., 4127 Ravenswood Ave., Chicago, Ill.
Perkins Machine Co., Warren, Mass.
U. S. Tool Co. Inc., Ampere, N. J.
V. & O. Press Co., The, Union Turnpike, Hudson, N. Y.
Walsh Press & Die Co., 4709 W. Kinzie St., Chicago, Ill.
Zeh & Hahnemann Co., 180 Vanderpool St., Newark, N. J.

PRESS GUARDS
Humm Tool & Mach. Co., 253 Sheffield Ave., B'klyn N. Y.

PRESSES, Arbor
A. B. C. Products, 11952 Montana Ave., West Los Angeles, Calif.
Atlas Press Co., 1849 N. Pitcher St., Kalamazoo, Mich.
Barnes Co., W. F. & John, Rockford, Ill.
Canedy-Otto Mfg. Co., Chicago Heights, Ill.
Chambersburg Engineering Co., Chambersburg, Pa.
Elmes Engineering Wks., Chas. F., 1001 Fulton St., Chicago, Ill.
Greenerd Arbor Press Co., 41 Crown St., Nashua, N. H.
Hannifin Mfg. Co., 621 S. Kolmar Ave., Chicago, Ill.
Hydraulic Press Mfg. Co., Mt. Gilead, Ohio
Lake Erie Engineering Corp., Kenmore Station, Buffalo, N. Y.
Logansport Machine Inc., Logansport, Ind.
Nicholson & Co., W. H., 114 Oregon St., Wilkes-Barre, Pa.
Smith, Inc., Winfield H., Springville, Erie County, N. Y.
Tomkins-Johnson Co., The, 615 N. Mechanic St., Jackson, Mich.

PRESSES, Broaching
American Broach & Mach. Co. (Div. of Sundstrand Mach. Tool Co.), Ann Arbor, Mich.
Baldwin-Southwark Corp., Paschall P. O. Station, Philadelphia, Pa.
Elmes Engineering Wks., Chas. F., 1001 Fulton St., Chicago, Ill.
General Mfg. Co., 6436 Farnsworth Ave., Detroit, Mich.
Hannifin Mfg. Co., 621 S. Kolmar Ave., Chicago, Ill.
Hydraulic Press Mfg. Co., Mt. Gilead, Ohio
Oilgear Co., The, 1403 W. Bruce St., Milwaukee, Wis.

PRESSES, Drop (see Hammers, Drop)
Peck, Stow & Wilcox Co., Southington, Mass.

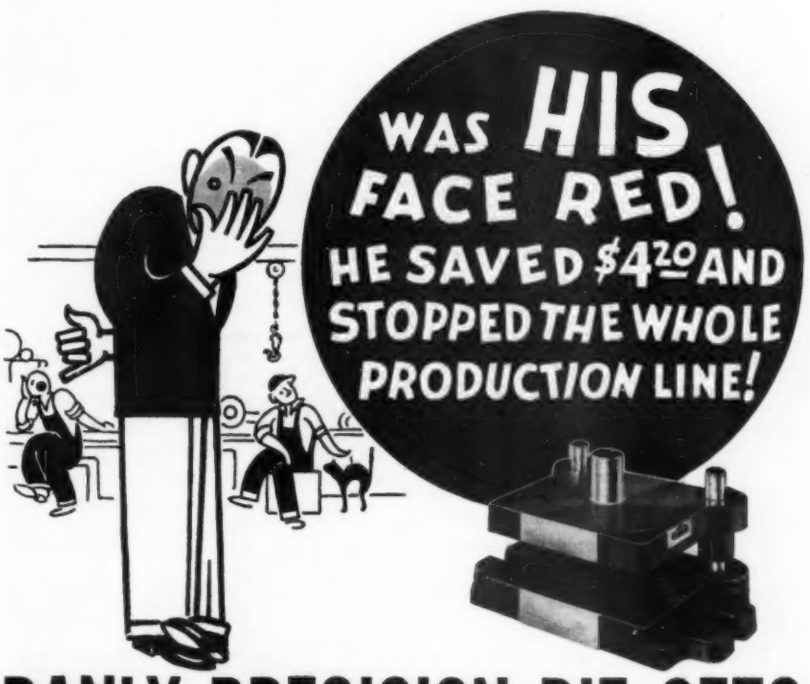
PRESSES, Foot
Baird Machine Co., Bridgeport, Conn.
Lake Erie Engineering Corp., Kenmore Station, Buffalo, N. Y.
Perkins Machine Co., Warren, Mass.
Service Machine Co., 752 Broadway, Elizabeth, N. J.
V. & O. Press Co., Union Turnpike, Hudson, N. Y.
Walsh Press & Die Co., 4709 W. Kinzie St., Chicago, Ill.
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.

PRESSES, Forcing
Barnes Co., W. F. & John, Rockford, Ill.
Baldwin-Southwark Corp., Paschall P. O. Station, Philadelphia, Pa.
Chambersburg Engineering Co., Chambersburg, Pa.
Elmes Engineering Wks., Chas. F., 1001 Fulton St., Chicago, Ill.
Fox Machine Co., 1410 W. Ganson St., Jackson, Mich.
General Manufacturing Co., 6430 Farnsworth Ave., Detroit, Mich.
Greenerd Arbor Press Co., 41 Crown St., Nashua, N. H.
Hydraulic Press Mfg. Co., Mount Gilead, Ohio
Hannifin Mfg. Co., 621 S. Kolmar Ave., Chicago, Ill.
Keckley, C. O., 567 Washington Blvd., Chicago, Ill.
Oilgear Co., The, 1403 W. Bruce St., Milwaukee, Wis.
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.
Watson-Stillman Co., New York, N. Y.
Williams, White & Co., Moline, Ill.

PRESSES, Forging
Ajax Mfg. Co., Euclid Branch P. O., Cleveland, Ohio
Bliss Co., E. W., Brooklyn, N. Y.
Baldwin-Southwark Corp., Paschall P. O. Station, Philadelphia, Pa.
Chambersburg Engineering Co., Chambersburg, Pa.
Cleveland Punch & Shear Works Co., East 40th & St. Clair Ave., Cleveland, Ohio
Elmes Engineering Wks., Chas. F., 1001 Fulton St., Chicago, Ill.
Erie Foundry Co., Erie, Pa.
Hannifin Mfg. Co., 621 Kolmar Ave., Chicago, Ill.
Henderson Machine Co., 5023 Germantown Ave., Philadelphia, Pa.
Hydraulic Press Mfg. Co., Mount Gilead, Ohio
Lake Erie Engineering Corp., Kenmore Station, Buffalo, N. Y.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
National Machinery Co., Greenfield St., Tiffin, Ohio
Perkins Machine Co., Warren, Mass.
Walsh Press & Die Co., 4709 W. Kinzie St., Chicago, Ill.
Williams, White & Co., Moline, Ill.

PRESSES, Hand Screw
Chas. E. Francis Co., Rushville, Ind.

PRESSES, Hydraulic
American Broach Machine Co., 415 W. Huron St., Ann Arbor, Mich.
Atlas Press Co., 1849 N. Pitcher St., Kalamazoo, Mich.
Bliss, E. W., Brooklyn, N. Y.
Baldwin-Southwark Corp., Paschall P. O. Station, Philadelphia, Pa.
Buckeye Iron & Brass Works, 326 E. 3rd St., Dayton, Ohio
Chambersburg Engineering Co., Chambersburg, Pa.
Davis Keyseater Co., 399 Exchange St., Rochester, N. Y.
Dudgeon Inc., Richard, 24 Columbia St., New York
Dunning & Boschert Press Co., Inc., 390 W. Water St., Syracuse, N. Y.
Elmes Engineering Wks., Chas. F., 1001 Fulton St., Chicago, Ill.
Erie Foundry Co., Erie, Pa.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Fox Machine Co., 1410 W. Ganson St., Jackson, Mich.
Francis Co., Charles E., Rushville, Ind.
Greenerd Arbor Press Co., 41 Crown St., Nashua, N. H.
General Machinery Corp. (Niles Tool Wks. Div.), 545 North Third St., Hamilton, Ohio
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hannifin Mfg. Co., 621 South Kolmar Ave., Chicago, Ill.
Hydraulic Press Mfg. Co., Mount Gilead, Ohio
Index Machinery Corp., 49 Central Ave., Cincinnati, Ohio
Keckley, C. O., 567 Washington, Blvd., Chicago, Ill.
Lake Erie Engineering Corp., Kenmore Station, Buffalo, N. Y.
Lapointe Machine Tool Co., 34 Tower St., Hudson, Mass.
Logansport Machine Inc., Logansport, Ind.
Marburg Brothers, Inc., 90 West St., New York, N. Y.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.



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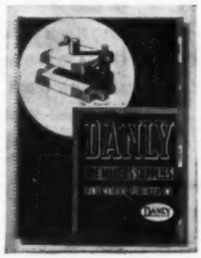

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Dayton, Ohio, 990 E. Monument Avenue ● Cleveland, Ohio, 1444 E. 49th Street
Detroit, Michigan, 1549 Temple Avenue ● Philadelphia, Pa., 3913 N. Broad Street

DANLY PRECISION DIE SETS

PRESSES, HYDRAULIC (Cont.)

Oilgear Co., The, 1403 W. Bruce St., Milwaukee, Wis.
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.
Watson-Stillman Co., New York, N. Y.
West Tire Setter Co., Rochester, N. Y.
Williams, White & Co., Moline, Ill.

PRESSES, Power

Allsteel Press Co., Chicago, Ill.
Automatic Machine Company, Bridgeport, Conn.
Ams Machine Co., Max, Bridgeport, Conn.
Baird Machine Co., Bridgeport, Conn.
Bliss Co., E. W., Brooklyn, N. Y.
Chambersburg Engineering Co., Chambersburg, Pa.
Clearing Mach. Co., 6499 W. 65th St., Chicago, Ill.
Cleveland Planner Co., 3148 Superior Ave., Cleveland, Ohio
Cleveland Punch & Shear Works Co., East 40th & St. Clair Ave., Cleveland, Ohio
Columbia Machine Tool Co., 1790 Fairgrove Ave., Hamilton, Ohio
Davis Keyseater Co., 399 Exchange St., Rochester, N. Y.
Erie Foundry Co., Erie, Pa.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Federal Press Co., Elkhart, Ind.
Ferracute Machine Co. Bridgeton, N. J.
Fox Machine Co., 1410 W. Ganson St., Jackson, Mich.
General Manufacturing Co., 6430 Farnsworth Ave., Detroit, Mich.
Hendey Machine Co., 105 Summer St., Torrington, Conn.
Henderson Machine Co., 5032 Germantown Ave., Philadelphia, Pa.
Henry & Wright Mfg. Co., 760 Windsor St., Hartford, Conn.
Hydraulic Press Mfg. Co., Mount Gilead, Ohio
Loshbough-Jordan Tool & Machine Co., Elkhart, Ind.
Marburg Brothers, Inc., 90 West St., New York N. Y.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Peck, Stow & Wilcox Co., Southington, Mass.
Pels and Co., Henry, New York, N. Y.
Rockford Iron Works, 648 Race St., Rockford, Ill.
Service Machine Co., 752 Broadway, Elizabeth, N. J.
Steege Mach. Co., Chicago, Ill.
Taylor & Fenn Co., The, 54 Arch St., Hartford, Conn.
Thomas Spacing Machine Co., Pittsburgh, Pa.
United Engrg. & Foundry Co., Pittsburgh, Pa.
V. & O. Press Company, The, Union Turnpike, Hudson, N. Y.
Verdin, Koppes, Verdin Co., 108 W. 2nd St., Cincinnati, Ohio
Walsh Press & Die Co., 4709 W. Kinzie St., Chicago, Ill.
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.
Wiedemann Machine Co., 1815 Sedgley Ave., Philadelphia, Pa.
Whitney Metal Tool Co., Rockford, Ill.
Williams, White & Co., Moline, Ill.
Zeh & Hahnemann Co., 180 Vanderpool St., Newark, N. J.

PRESSES, Straightening

Atlas Press Co., 1819 N. Pitcher St., Kalamazoo, Mich.
Baldwin-Southwark Corp., Paschall P. O. Station, Philadelphia, Pa.
Chambersburg Engineering Co., Chambersburg, Pa.
Cleveland Punch & Shear Works Co., East 40th & St. Clair Ave., Cleveland, Ohio
Consolidated Machine Tool Corp., Rochester, N. Y.
Elmes Engineering Wks., Chas. F., 1001 Fulton St., Chicago, Ill.
Fox Machine Co., 1410 W. Ganson St., Jackson, Mich.
General Manufacturing Co., 6430 Farnsworth Ave., Detroit, Mich.
Greenerd Arbor Press Co., 41 Crown St., Nashua, N. H.
Hannifin Mfg. Co., 621 South Kolmar Ave., Chicago, Ill.
Hydraulic Press Mfg. Co., Mount Gilead, Ohio
Keckley, C. O., 567 Washington Blvd., Chicago, Ill.
Lake Erie Engineering Corp., Kenmore Station, Buffalo, N. Y.
Mesta Machine Co., P. O. Box 1466 Pittsburgh, Pa.
Morse Twist Drill & Mach. Co., 163 Pleasant St. New Bedford, Mass.
Oilgear Co., The, 1403 W. Bruce St., Milwaukee, Wis.
Springfield Machine Tool Co., The, 631 West Southern Ave., Springfield, Ohio
United Engrg. & Foundry Co., Pittsburgh, Pa.
Watson-Stillman Co., Roselle, N. J.
Western Tool & Mfg. Co., Springfield, Ohio
Williams, White & Co., Moine, Ill.

PROFILE PROJECTORS

Lietz, Inc., E., 69 E. 10th St., New York

PROFILING MACHINES

Automatic Machine Co., Bridgeport, Conn.
Cincinnati Milling Machine Co., (Cinn.-Gardner, Inc), Cincinnati, Ohio
Consolidated Machine Tool Corp., Rochester, N. Y.
Frew Machine Co., 126 West Venango St., Philadelphia, Pa.
Gorton Machine Co., Geo., 1103 13th St., Racine, Wis.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Reed-Prentice Co., 677 Cambridge St., Worcester, Mass.

PROTRACTORS

Brown & Sharpe Mfg. Co., Providence, R. I.
Lufkin Rule Co., The, Saginaw, Mich.
Starrett Co., The, L. S., Crescent St., Athol, Mass.
Taft-Peirce Mfg. Co., The, 32 Mechanic Ave., Woonsocket, R. I.

PULLEYS

Boston Gear Works, Inc., North Quincy, Ill.
Brown & Sharpe Mfg. Co., Providence, R. I.
Carlyle Johnson Machine Co., 52 Main St., Manchester, Conn.
Dayton Rubber Mfg. Co., The, Dayton, Ohio
Diamond Chain & Mfg. Co., 402 Kentucky Ave., Indianapolis, Ind.
Dodge Mfg. Corp., Mishawaka, Ind.
Hanson Clutch & Machinery Co., Tiffin, Ohio
Link Belt Co., 2410 W. 18 St., Chicago, Ill.
Miller & Co., Carl A., 2-4 Howard St., N. Y.
Savage Co., W. J., Clinch Ave and Tenth St., Knoxville, Tenn.
Smith, Winfield H., Inc., Springfield, Erie County, N. Y.

PULLEYS, Magnetic

Ingersoll-Rand & Co., 11 Bway, N. Y. C.
Stearns Magnetic Mfg. Co., Milwaukee, Wis.

PUMPS, Centrifugal

Beach-Rust Co., 40 Church St., New York
DeLaval Steam Turbine Co., Trenton, N. J.
Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill.
Ingersoll-Rand Co., 11 Broadway, New York
Tomkins-Johnson Co., 615 N. Mechanic St., Jackson, Mich.

PUMPS, Hydraulic

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Broach Machine Co., 415 W. Huron St., Ann Arbor Mich.
American Engineering Co., 2407 Aramingo Ave., Philadelphia, Pa.
Baldwin-Southwark Corp., Paschall P. O. Station, Philadelphia, Pa.
Buckeye Iron & Brass Works, 326 E. 3rd St., Dayton, Ohio
Chambersburg Engineering Co., Chambersburg, Pa.
Clarksville Foundry & Machine Works, Commerce & Spring Sts., Clarksville, Tenn.
DeLaval Steam Turbine Co., Trenton, N. J.
Dudgeon Inc., Richard, 24 Columbia St., New York
Dunning & Boschert Press Co., Inc., 390 W. Water St., Syracuse, N. Y.
Elmes Engineering Wks., Chas. F., 1001 Fulton St., Chicago, Ill.
Fairbanks, Morse & Co. 900 S. Wabash Ave., Chicago, Ill.
Galland-Henning Mfg. Co., Milwaukee, Wis.
Homestead Valve Mfg. Co., Coraopolis, Pa.
Hydraulic Press Mfg. Co. Mount Gilead, Ohio
Index Machinery Corp., 49 Central Ave., Cincinnati.
Intersoll-Rand Co., 11 Broadway, New York
Keckley, C. O., 567 Washington Blvd., Chicago, Ill.
Lapointe Machine Tool Co., 34 Tower St., Hudson, Mass.
Mesta Machine Co., P. O Box 1466, Pittsburgh, Pa.
Oilgear Co., The, 1403 W. Bruce St., Milwaukee, Wis.
Racine Tool & Machine Co., 1751 State St., Racine, Wis.
Roper Corp., Geo. W., Blackhawk Park Ave., Rockford, Ill.
Savage Co., W. J. Clinch Ave. and Tenth St., Knoxville, Tenn.
Sundstrand Machine Tool Co., Rockford, Ill.
E. B. Van Atta and Co., Inc., Penn Ave., Olsen, N. Y.
Vickers, Incorporated, 1400 Oakman Blvd., Detroit, Mich.
Viking Pump Co., 4th & State Sts., Cedar Falls, Iowa
Watson-Stillman Co., New York, N. Y.
West Tire Setter Co., 399 Exchange St., Rochester, N. Y.

PUMPS, Lubricants and Oil

Beach-Rust Co., 40 Church St., New York
Bijur Lubricating Corp., 2212 43rd Ave., Long Island City, N. Y.
Brown & Sharpe Mfg. Co., Providence, R. I.
Buffalo Forge Co., 448 Broadway, Buffalo, N. Y.
DeLaval Steam Turbine Co., Trenton, N. J.
Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill.
Ingersoll-Rand Co., 11 Broadway, New York
Rivett Lathe & Grinder Co., Inc., 20 Riverview Rd., Brighton, Boston, Mass.
Roper Corp., Geo. W., Blackhawk Park Ave., Rockford, Ill.
Ruthman Machinery Co., The, Front and Pike Sts., Cincinnati, Ohio
Sundstrand Machine Tool Co., Rockford, Ill.
Tomkins-Johnson Co., The, 615 N. Mechanic St., Jackson, Mich.
Vickers Incorporated, 1400 Oakman Blvd., Detroit, Mich.
Viking Pump Co., 4th & State Sts., Cedar Falls, Iowa

PUNCHING AND SHEARING MACHINES

Beatty Mach. & Mfg. Co., Hammond, Ind.
Bliss Co., E. W., Brooklyn, N. Y.
Buffalo Forge Co., 448 Broadway, Buffalo, N. Y.
Callahan Can Machine Co., Inc., 80 Richards
Chambersburg Engineering Co., Chambersburg, Pa.
Champion Blower and Forge Co., Harrisburg Ave., Lancaster, Pa.
Cleveland Punch & Shear Works Co., E. 40th and St. Clair Ave., Cleveland, Ohio
Columbia Machine Tool Co., 1790 Fairgrove Ave., Hamilton, O.
Consolidated Machine Tool Corp., Rochester, N. Y.
Flexo Machines, 816 W. Erie St., Chicago, Ill.
Bendley and Whittmore Co., 10 S. State St., Beloit, Wis.
Helwig Mfg. Co., St. Paul Minn.
Kent-Owens Machine Co., Toledo, Ohio
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Peck Stove Wilcox Co., Southington, Conn.
Pels and Co., Henry, New York, N. Y.
Perkins Machine Co., Warren, Mass.
Rock River Machine Co., Janesville, Wis.
Ryerson Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Schatz Mfg. Co., Poughkeepsie, N. Y.
Service Machine Co., 752 Broadway, Elizabeth, N. J.
Strippit Corp., 1559 Niagara St., Buffalo, N. Y.
W. A. Whitney Mfg. Co., 636 Race St., Rockford, Ill.
Thomas Spacing Machine Co., Pittsburgh, Pa.
Whitney Metal Tool Co., Rockford, Ill.
Wickes Bros., 512 N. Water St., Saginaw, Mich.
Wiedemann Machine Co., 1815 Sedgley Ave., Philadelphia, Pa.
Williams, White & Co., Moline, Ill.

PUNCHES, Center and Hand

American Swiss File & Tool Co., Elizabeth, N. J.
Armstrong-Glum Mfg. Co., 347 N. Francisco Ave., Chicago, Ill.
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland Punch & Shear Works Co., East 40th and St. Clair Ave., Cleveland, Ohio
Helwig Mfg. Co., St. Paul, Minn.
Hendley and Whittemore Co., 10 S. State St., Beloit, Wis.
Lufkin Rule Co., The, Saginaw, Mich.
Stanley Tools, New Britain, Conn.
Starrett Co., The L. S., Crescent St., Athol, Mass.
Whitney Metal Tool Co., Rockford, Ill.
Wiedemann Machine Co., 1815 Sedgley Ave., Philadelphia, Pa.

PUNCHES, Power

Beatty Machine & Mfg. Co., Hammond, Ind.
Bertsch and Co., Cambridge City, Ind.
Bliss Co., E. W., Brooklyn, N. Y.
Buffalo Forge Co., 448 Broadway, Buffalo, N. Y.
Callahan Can Machine Co., Inc., 80 Richards St., Brooklyn, N. Y.
Cleveland Punch & Shear Works Co., East 40th and St. Clair Ave., Cleveland, Ohio
Columbia Machine Tool Co., 1790 Fairgrove Ave., Hamilton, O.
Consolidated Machine Tool Corp., Rochester, N. Y.
Henderson Machine Co., 5032 Germantown Ave., Philadelphia, Pa.
Hendley and Whittemore Co., 10 S. State St., Beloit, Wis.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Peck, Stow & Wilcox Co., Southington, Mass.
Pels and Co., Henry, New York, N. Y.
Perkins Machine Co., Warren, Mass.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Rockford Iron Works, 648 Race St., Rockford, Ill.
Rock River Machine Co., Janesville, Wis.
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Service Machine Co., 752 Broadway, Elizabeth, N. J.
Strippit Corp., 1559 Niagara St., Buffalo, N. Y.
Whitney Metal Tool Co., Rockford, Ill.
Wiedemann Machine Co., 1815 Sedgley Ave., Philadelphia, Pa.
Williams, White & Co., Moline, Ill.

PYROMETER, Protection Tubes

Driver-Harris Co., Harrison, N. J.
Hoskins Mfg. Co., 4445 Lawton Ave., Detroit, Mich.
Tagliabue Mfg. Co., C. J., Park & Nostrand Ave., Brooklyn, N. Y.
Wheelco Instruments Co., 1112 Milwaukee Ave., Chicago, Ill.

PYROMETERS, Electric

Bristol Co., Waterbury, Conn.
Foxboro Co., 122 Neponset Ave, Foxboro, Mass.
Hoskins Mfg. Co., 4445 Lawton Ave., Detroit, Mich.
Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia, Pa.

PYROMETERS, Electric—(Cont.)
Pyrometer Instrument Co., 103 Lafayette St., New York
Strong, Carlisle & Hammond Co., 1392 W. Third St., Cleveland, Ohio
Tagliabue Mfg. Co., C. J., Park & Nostrand Ave., Brooklyn, N. Y.
Wheelco Instruments Co., 1112 Milwaukee Ave., Chicago, Ill.

PYROMETERS, Optical and Radiation
Pyrometer Instrument Co., 100 Lafayette St., New York

PYROMETER, Protection Wells
Bristol Co., Waterbury, Conn.

RACK-CUTTING MACHINES
Fellows Gear Shaper Co., 78 River St., Springfield, Vt.
Gould & Eberhardt, 480 Chancellor Ave., Irvington, N. J.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Scherr Co., Inc., Geo., 128 Lafayette St., New York, N. Y.

RACKS, Barrel and Drum
Barrett-Cravens Co., 3255 W. 30th St., Chicago, Ill.

RACKS, Gear, Cut
Adams Co., East Fourth St., Dubuque, Ia.
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Gear Co., 1825 Reading Rd., Cincinnati, Ohio
Cincinnati Lathe & Tool Co., Oakley, Cincinnati, Ohio
Colonial Broach Co., Detroit, Mich.
Chas. E. Crofoot Gear Corp., South Easton, Mass.
Detroit Tap & Tool Co., Detroit, Mich.
Earle Gear & Machine Co., 4723 Stenton Ave., Philadelphia, Pa.
Foote Gear Works Inc., 1301 South Cicero Ave., Cicero, Ill.
Gar[illegible]how Gear Co., 1013 Washington Blvd., Chicago, Ill.
Gear Specialties Inc., 2635 Canton St., Chicago, Ill.
Grant Gear Works, Inc., 154 W. Second St., South Boston, Mass.
Hartford Special Machinery Co., 282 Homestead Ave., Hartford, Conn.
Horsburgh & Scott Co., 5114 Hamilton Ave., Cleveland, Ohio
Link Belt Co., 2410 W. 18th St., Chicago, Ill.
Massachusetts Gear & Tool Co., 25 Nashua St., Woburn, Mass.
Mechanical Specialties, Inc., Chicago, Ill.
Meisel Press Mfg. Co., Boston, Mass.
Michigan Tool Co., Detroit, Mich.
Philadelphia Gear Works, Philadelphia, Pa.
Vinco Tool Co., 7350 Central Ave., Detroit, Mich.

RASPS **(see Files and Rasps)**

RATCHETS **(see Gears, Cut)**

REAMERS, Adjustable
Carboloy Co. Inc., 2987 E. Jefferson Ave., Detroit, Mich.
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio
Clough, R. M., Meridan, Conn.
Colonial Broach Co., Detroit, Mich.
Davis Boring Tool Co. (Div. Larkin Packer Co.), 6200 Maple Ave., St. Louis, Mo.
Detroit Tap & Tool Co., Detroit, Mich.
Foster Machine Co., 1100 Beasley Ave., Elkhart, Ind.
Gairing Tool Co., 629 Lafayette Blvd., Detroit
Gammons Holman Co., 405 Main St., Manchester, Conn.
Gisholt Machine Co., 1201 E. Washington Ave., Madison, Wis.
Greenfield Tap & Die Corp., Sanderson St., Greenfield, Mass.
Ingersoll Milling Machine Co., Rockford, Ill.
Kelly Reamer Co., 3775 Ridge Road, Cleveland, Ohio
McCrosky Tool Corp., 1340-80 S. Main St., Meadville, Pa.
Michigan Tool Co., Detroit, Mich.
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Standard Tool Co., The, 6918 Central Ave., Cleveland, Ohio
Super Tool Company, 356 E. Congress St., Detroit, Mich.
Taft-Peirce Mfg. Co., The, 32 Mechanic Ave., Woonsocket, R. I.
Union Twist Drill Co., Athol, Mass.
Wetmore Reamer Co, 418 N. 27th St., Milwaukee, Wis.

REAMERS, Cemented Carbide Tipped
Barber-Colman Co., River & Loomis Sts., Rockford, Ill.
Carboloy Co., Inc., 2987 E. Jefferson Ave., Detroit, Mich.
Ex-Cell-O Aircraft and Tool Corp., 1200 Oakman Blvd., Detroit, Mich.
Firth Sterling Steel Co., McKeesport, Pa.
Gairing Tool Co., 629 Lafayette Blvd., Detroit, Mich.
Kelly Reamer Co., 3775 Ridge Road, Cleveland, Ohio
Super Tool Company, 356 E. Congress St., Detroit, Mich.

REAMERS, Pipe
American Swiss File & Tool Co., Elizabeth, N. J.
Armstrong-Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Beaver Pipe Tools Inc., 1937 Amma Ave., Warren, Ohio
Butterfield Div. (Union Twist Drill Co.), Derby Line, Vt.
Card Mfg. Co., S. W., (Div. Union Twist Drill) Mansfield, Mass.
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio
Colonial Broach Co., Detroit, Mich.
Detroit Tap & Tool Co., Detroit, Mich.
Gairing Tool Co., 629 Lafayette Blvd., Detroit, Mich.
Greenfield Tap & Die Corp., Sanderson St., Greenfield, Mass.
Michigan Tool Co., Detroit, Mich.
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
National Twist Drill & Tool Co., 6522 Brush St., Detroit, Mich.
Oster Mfg. Co., The, 2057 E. 61st Pl., Cleveland, Ohio
Standard Tool Co., The, 6918 Central Ave., Cleveland, Ohio
Torrington Co., The, Field St., Torrington, Conn.

REAMERS, Solid
Butterfield Div. (Union Twist Drill Co.), Derby Line, Vt.
Carboloy Co., Inc., 2989 E. Jefferson Ave., Detroit, Mich.
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio
Colonial Broach Co., Detroit, Mich.
Davis Boring Tool Co. (Div. Larkin Packer Co.), 6200 Maple Ave., St. Louis, Mo.
Detroit Tap & Tool Co., Detroit, Mich.
Ex-Cell-O Aircraft and Tool Corp., 1200 Oakman Blvd., Detroit, Mich.
Gairing Tool Co., 629 Lafayette Blvd., Detroit
Gammons Holman Company, 405 Main St., Manchester, Conn.
Gorham Tool Co., 14400 Woodrow Wilson Ave., Detroit, Mich.
Greenfield Tap & Die Corp., Sanderson St., Greenfield, Mass.
Haynes Stellite Co., Kokomo, Ind.
Holman Reamer Co., 29 Summit St., Manchester, Conn.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
Michigan Tool Co., Detroit, Mich.
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
National Twist Drill & Tool Co., 6522 Brush St., Detroit, Mich.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Standard Tool Co., The, 6918 Central Ave., Cleveland, Ohio
Super Tool Company, 356 E. Congress St., Detroit, Mich.
Union Twist Drill Co., Athol, Mass.

REAMERS, Taper Pin Hole
Butterfield Div. (Union Twist Drill Co.), Derby Line, Vt.
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio
Colonial Broach Co., Detroit, Mich.
Davis Boring Tool Co. (Div. Larkin Packer Co.), 6200 Maple Ave., St. Louis, Mo.
Detroit Tap & Tool Co., Detroit, Mich.
Gairing Tool Co., 629 Lafayette Blvd., Detroit, Mich.
Gammons Holman Co., 405 Main St., Manchester, Conn.
Greenfield Tap & Die Corp., Sanderson St., Greenfield, Mass.
Holman Reamer Co., Manchester, Conn.
Michigan Tool Co., Detroit, Mich.
Morse Twist Drill & Machine Co., 163 Pleasant St., New Bedford, Mass.
National Twist Drill & Toll Co., 6522 Brush St., Detroit, Mich.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Standard Tool Co., The, 6918 Central Ave., Cleveland, Ohio
Union Twist Drill Co., Athol, Mass.

REAMING MACHINES, Portable Electric, and Pneumatic
Black & Decker Mfg. Co., Towson, Md.
Buckeye Portable Tool Co., 29 W. Apple St., Dayton, Ohio
Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y.
Hisey-Wolf Machine Co., Cincinnati, Ohio
Independent Pneumatic Tool Co., Chicago, Ill.
Ingersoll-Rand Co., 11 Broadway, New York
Rotor Air Tool Co., 5704 Carnegie Ave., Cleveland, Ohio
Standard Electrical Tool Co., 1940 W. 8th St., Cincinnati, Ohio
Taft-Peirce Mfg. Co., The, 32 Mechanic Ave., Woonsocket, R. I.
United States Electrical Tool Co., 2488 W. 6th St., Cincinnati, Ohio
Van Dorn Electric Tool Co., 716 Joppa Road, Towson, Md.

RECEIVERS, Air and Gas
Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y.
Curtis Pneumatic Mach. Co., 1924 Kienlen Ave., St. Louis, Mo.
Ingersoll-Rand Co., 11 Broadway, New York

RECLAIMING ROLLS
Ajax Mfg. Co., Euclid Branch P. O., Cleveland, Ohio
Foxboro Co., 122 Neponset Ave., Foxboro, Mass.

RECORDERS, Pressure
Bristol Co., Waterbury, Conn.
Foxboro Co., 122 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia, Pa.
Tagliabue Mfg. Co., C. J., Park & Nostrand Ave., Brooklyn, N. Y.
Taylor & Fenn Co., 94 Arch St., Hartford, Conn.

RECORDERS, Speed
Bristol Company, Waterbury, Conn.
Foxboro Co., 122 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia, Pa.
Veeder-Root Incorporated, Hartford, Conn.

RECORDERS, Temperature
Bristol Co., Waterbury, Conn.
Foxboro Co., 122 Neponset Ave., Foxboro, Mass.
Hoskins Mfg. Co., 4445 Lawton Ave., Detroit, Mich.
Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia, Pa.
Partlow Corp., 2 Campion Road, New Hartford, N. Y.
Tagliabue Mfg. Co., C. J., Park & Nostrand Ave., Brooklyn, N. Y.
Taylor & Fenn Co., 94 Arch St., Hartford, Conn.

RECORDERS, Time
Bristol Co., Waterbury, Conn.
Foxboro Co., 122 Neponset Ave., Foxboro, Mass.
Tagliabue Mfg. Co., C. J., Park & Nostrand Ave., Brooklyn, N. Y.

RECTIFIERS, Mercury Arc
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

RECTIFIERS, Power
Pier Equipment Mfg. Co., Milton & Cross Sts., Benton Harbor, Mich.
Ward Leonard Elec. Co., Mount Vernon, N. Y.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

REDUCERS, Speed **(see Speed Reducers)**

REFLECTORS, Lighting
Benjamin Electric Mfg. Co., Des Plaines, Ill.

REFRACTORIES
Carborundum Co., Niagara Falls, N. Y.
Norton Co., Worcester, Mass.
Strong, Carlisle & Hammond Co., 1392 W. Third St., Cleveland, Ohio

REGULATORS, Electric Current
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Ward Leonard Elec. Co., Mount Vernon, N. Y.
Westinghouse Elec & Mfg. Co., East Pittsburgh, Pa.

REGULATORS, Oxygen and Acetylene
Air Reduction Sales Co., 60 E. 42nd St., New York, N. Y.
Linde Air Products Co., 30 E. 42nd St., New York, N. Y.

REGULATORS, Speed
Link-Belt Co., 2405 W. Hunting Post Ave., Philadelphia, Pa.

REGULATORS, Temperature
Automatic Temperature Control Co., 34 E. Logan St., Pittsburgh, Pa.
Barber-Colman Co., Rockford, Ill.
Bristol Company, Waterbury, Conn.
Brown Instrument Co. (A Div. of Minneapolis-Honeywell Reg. Co.) 4501 Wayne Ave., Philadelphia, Pa.
Foxboro Co., 122 Neponset Ave., Foxboro, Mass.
Keckley, C. O., 567 Washington Blvd., Chicago, Ill.
Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia, Pa.
Partlow Corp., 2 Campion Road, New Hartford, N. Y.
Tagliabue Mfg. Co., C. J., Park & Nostrand Ave., Brooklyn, N. Y.

REINFORCEMENT FABRIC, Concrete
Pittsburgh Steel Co., Union Trust Bldg., Pittsburgh, Pa.
Wickwire Spencer Steel Co., New York City

REMOVERS, Japan, Lacquer, Enamel, etc.
Oakite Products Co., 22 Thames St., New York, N. Y.

RESPIRATORS
American Optical Co., Southbridge, Mass.
Goodrich Co., B. F., 576 South Main St., Akron, Ohio

RHEOSTATS
Allen-Bradley Co., 1326 South Second St., Milwaukee, Wis.
Cutler Hammer Inc., Milwaukee, Wis.
Electric Controller & Mfg. Co., 2700 East 79th St., Cleveland, Ohio
General Electric Co., Schenectady, N. Y.
Monitor Controller Co., Gay, Lombard and Frederick Sts., Baltimore, Md.
Square D. Electric Co., 710 S 3rd St., Milwaukee, Wis.
Ward Leonard Elec. Co., Mount Vernon, N. Y.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

RIVET BOLTS
Dardelet Threadlock Corp., 120 B'way, N. Y.

RIVET CUTTING APPARATUS, Oxy-Acetylene
Air Reduction Sales Co., 60 E. 42nd St., New York
Linde Air Products Co., 30 E. 42nd St., New York

RIVET HEADING MACHINES
Acme Machinery Co., 4533 St. Clair Ave., Cleveland, Ohio
Ajax Mfg. Co., Euclid Branch, P. O. Cleveland, Ohio
Grant Mfg. & Machine Co., 90 Silliman Ave., Bridgeport, Conn.
National Machinery Co., Greenfield St., Tiffin, Ohio
Rock River Machine Co., Janesville, Wis.
Tomkins-Johnson Co., The, 615 N. Mechanic St., Jackson, Mich.
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.

RIVET HEATERS
American Car & Fdry Co., 30 Church St., N.Y.

RIVETERS, Hydraulic
Baldwin-Southwark Corp., Paschall P. O. Station, Philadelphia, Pa.
Chambersburg Engineering Co., Chambersburg, Pa.
Elmes Engineering Wks., Chas. F., 1001 Fulton St., Chicago, Ill.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hannifin Mfg. Co., 621 S. Kolmar Ave., Chicago, Ill.

RIVETING HAMMERS
Chicago Pneumatic Tool Co., 6 East 44th St., New York, N. Y.
High Speed Hammer Co., Inc., 119 Norton St., Rochester, N. Y.
Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill.
Ingersoll-Rand Co., 11 Broadway, New York
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Williams, White & Co., Moline, Ill.

RIVETING MACHINES
Buffalo Forge Co., 448 Broadway, Buffalo, N. Y.
Chicago Pneumatic Tool Co., 6 East 44th St., New York, N. Y.
Grant Mfg. & Machine Co., 90 Silliman Ave., Bridgeport, Conn.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hannifin Mfg. Co., 621 South Kolmar Ave., Chicago, Ill.
High Speed Hammer Co., Inc., 119 Norton St., Rochester, N. Y.
Independent Pneumatic Tool Co., Chicago, Ill.
Ingersoll-Rand Co., 11 Broadway, New York, N. Y.
Linley Bros Co., 577 Fairfield Ave., Bridgeport, Conn.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Rock River Machine Co., Janesville, Wis.
Tomkins-Johnson Co., The, 615 N. Mechanic St., Jackson, Mich.
Tubular Rivet & Steel Co., Boston, Mass.
Whitney Metal Tool Co., Rockford, Ill.
Williams, White & Co., Moline, Ill.

RIVETS
American Steel & Wire Co., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Dardelet Threadlock Corp., 120 Bdwy., N. Y.
Tubular Rivet & Steel Co., Boston, Mass.

RIVETS, Aluminum
Aluminum Co. of America, 2107 Gulf Bldg., Pittsburgh, Pa.

RIVETS, Copper, Brass and Bronze
Revere Copper & Brass Corp., 230 Park Ave., New York, N. Y.

RIVET SETS
American Swiss File & Tool Co., Elizabeth, N. J.
Cleveland Punch & Shear Works Co., East 40th and St. Clair Ave., Cleveland, Ohio
Ingersoll-Rand Co., 11 Broadway, New York

ROD, Welding Hard Facing
Haynes-Stellite Co., Harrison & Lindsay Sts., Kokomo, Ind.

RODS, Wire
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Pittsburgh Steel Co., Union Trust Bldg., Pittsburgh, Pa.
Wickwire, Spencer Steel Co., New York City

ROLLER BEARINGS (see Bearings, Roller)

ROLLERS, Bearing
Bantam Ball Bearing Co., South Bend, Ind.
Torrington Co., The, Field St., Torrington, Conn.

ROLLS, Bending
Baldwin-Southwark Corp., Paschall P. O. Station, Philadelphia, Pa.
Buffalo Forge Co., 448 Broadway, Buffalo, N. Y.
Champion Blower & Forge Co., Harrisburg Ave., Lancaster, Pa.
Cleveland Punch & Shear Works Co., East 40th and St. Clair Ave., Cleveland, Ohio.
Consolidated Machine Tool Corp., Rochester, N. Y.
General Machinery Corp. (Niles Tool Wks. Div.), 545 North Third Street, Hamilton, Ohio
Hendley and Whittemore Co., 10 S. State St., Beloit, Wis.
Kane & Roach, Syracuse, N. Y.
Marshalltown Mfg. Co., 900 E. Nevada St., Marshalltown, Iowa
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Peck, Stow & Wilcox, Southington, Mass.
Ryerson & Son, Inc., Jos. T., 2558 W. 16th St., Chicago, Ill.
United Engrg. & Fdry. Co., Pittsburgh, Pa.
Wicks Bros., 512 No. Water St., Saginaw, Mich.
Williams, White & Co., Moline, Ill.

ROLLS, Hardened Tool Steel
Carpenter Steel Co., 109 W. Bern St., Reading, Pa.
Prosser & Sons, Thomas, 15 Gold St., New York

ROLLS, Magnetic
Magnetic Mfg. Co., Milwaukee, Wis.

ROTARY FILES
Ford Mfg. Co., M. A., Davenport Iowa
Grobet File Corp. of America, 3 Park Place, New York
Charles L. Jarvis Co., Gildersleeve, Conn.
Mall Tool Co, 7740 S. Chicago Ave., Chicago
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Strand Co., N. A., 5001 No. Lincoln St., Chicago, Ill.

ROTARY PLANERS
Cleveland Punch & Shear Works Co., 3917 St. Clair Ave., Cleveland, Ohio
General Machinery Corp. (Niles Tool Wks. Div.), 545 North Third St., Hamilton, Ohio

ROUTING MACHINES
Gorton Machine Co., Geo., 1103 13th St., Racine, Wis.
Reed-Prentice Co., 677 Cambridge St., Worcester, Mass.

RUBBING MACHINES (Varnish, etc.)
Mattison Machine Works, Blackhawk Park Ave. and C.B.&Q. Tracks, Rockford, Ill.
Sundstrand Machine Co., Rockford, Ill.

RULES, Steel and Wood
Brown & Sharpe Mfg. Co., Providence, R. I.
Lufkin Rule Co., The, Saginaw, Mich.
Stanley Tools, New Britain, Conn.
Starrett Co., The, L. S., Crescent St., Athol, Mass.

RUST PREVENTIVES
American Coppercote, Inc., 480 Lexington Ave., New York
Bakelite Corp., Bound Brook, N. J.
Houghton & Co., E. F., Philadelphia, Pa.
Never Rust Mfg. Co., 1771 E. 18th St., Brooklyn, N. Y.
Oakite Products Co., 22 Thames St., New York, N. Y.
Socony-Vacuum Oil Co., New York, N. Y.
Standard Oil Co. of Indiana, 910 S. Michigan Ave., Chicago, Ill.

RUST PROOFING COMPOUNDS
American Coppercote, Inc., 480 Lexington Ave., New York, N. Y.
Bakelite Corp., Bound Brook, N. J.
Holden Co., A. F., 200 Winchester Ave., New Haven, Conn.
Houghton & Co., E. F., Philadelphia, Pa.
Never Rust Mfg. Co., 1771 E. 18th St., Brooklyn, N. Y.
Oakite Products Co., 22 Thames St., New York, N. Y.
Socony-Vacuum Oil Co., New York, N. Y.

SAFETY GUARDS FOR PUNCH PRESSES
Walsh Press & Die Co., 4709 W. Kinzie St., Chicago, Ill.

SAND BLAST EQUIPMENT
American Foundry Equipment Co., Mishawaka, Ind.
Benjamin Elec. Mfg. Co., Des Plaines, Ill.

SAND CUTTERS
American Foundry Equipment Co., Mishawaka, Ind.

SANDERS
Boice Crane Co., Toledo, Ohio
Buckeye Portable Tool Co., 29 West Apple St., Dayton, Ohio
Carborundum Co., Niagara Falls, New York
Champion Blower and Forge Co., Harrisburg Ave., Lancaster, Pa.
Mall Tool Co., 7740 S. Chicago Ave., Chicago, Ill.
Production Machine Co., Greenfield, Mass.
Rotor Air Tool Co., 5704 Carnegie Ave., Cleveland, Ohio
Strand Co., N. A., 5001 N. Lincoln St., Chicago
Walls Sales Corp., 96 Warren St., New York

SANDERS, Portable Electric
Black & Decker Mfg. Co., Towson, Md.
Buckeye Portable Tool Co., 29 West Apple St., Dayton, Ohio
Carborundum Co., Niagara Falls, New York
Chicago Pneumatic Tool Co., 6 East 44th St., New York, N. Y.
Haskins Co., R. G., 4630 W. Fulton St., Chicago, Ill.
Ingersoll-Rand Co., 11 Broadway, New York
Jarvis Co., Charles L., Gildersleeve, Conn.
Mall Tool Co., 7740 S. Chicago Ave., Chicago, Ill.
Porter-Cable Machine Co., 1725 N. Salina St., Syracuse, N. Y.
Pratt & Whitney Div. Niles-Bement-Pond, 436 Capitol Ave., Hartford, Conn.
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Skilsaw, Inc., 3310 Elston Ave., Chicago, Ill.
United States Electrical Tool Co., 2488 W. 6th St., Cincinnati, Ohio
Van Dorn Electric Tool Co., 716 Joppa Road, Towson, Md.

SAW SHARPENERS AND GUMMERS
Covel Mfg. Co., Benton Harbor, Mich.

SAWING MACHINES, Band
Armstrong-Blum Mfg. Co., 333 N. Francisco Ave., Chicago, Ill.
Atkins & Co., E. C., 424 So. Illinois St., Indianapolis, Ind.
Avey Drilling Machine Co., Cincinnati, O.
Champion Blower and Forge Co., Harrisburg Ave., Lancaster, Pa.
Cochrane-Bly Co., 15 St. James St., Rochester, N. Y.
Delta Mfg. Co., Vienne Ave., Milwaukee, Wis.
Grob Brothers, West Allis, Wis.
Index Machinery Corp., 49 Central Ave., Cincinnati, Ohio
Marburg Brothers, Inc., 90 West St., New York, N. Y.
Oliver Machinery Co., Grand Rapids, Mich.
Porter-Cable Machine Co., 1725 N. Salina St., Syracuse, N. Y.
Racine Tool & Machine Co., 1751 State St., Racine, Wis.
Ryerson & Son, Inc., Joseph T., 2558 W. 16th St. Chicago, Ill.
Wells Manufacturing Corp., 315 Seventh Ave., Three Rivers, Mich.

SAWING MACHINES, Flexible Shaft

SAWING MACHINES, Hot
Acme Machinery Co., 4533 St. Clair Ave., Cleveland, Ohio
Ajax Mfg. Co., Euclid Branch P. O., Cleveland, Ohio
Mall Tool Co., 7740 S. Chicago Ave., Chicago, Ill.
United Engrg. & Fdry Co., Pittsburgh, Pa.

SAWING MACHINES, Power Hack
Armstrong-Blum Mfg. Co., 333 N. Francisco Ave., Chicago, Ill.
Atkins & Co., E. C., 424 So. Illinois St., Indianapolis, Ind.
Champion Blower and Forge Co., Harrisburg Ave., Lancaster, Pa.
Cochrane-Bly Co., 15 St. James Place, Rochester, N. Y.
Marburg Brothers, Inc., 90 West St., New York, N. Y.
Oster Mfg. Co., The, 2057 East 61st Place, Cleveland, Ohio
Peerless Machine Co., 1615 Racine St., Racine, Wis.
Racine Tool & Machine Co., 1751 State St., Racine, Wis.
Ryerson & Son, Joseph T., Inc., 2558 W. 16th St., Chicago, Ill.
Wells Manufacturing Corp., 315 Seventh Ave., Three Rivers, Mich.

SAWS, Band
Armstrong-Blum Mfg. Co., 333 N. Francisco Ave., Chicago, Ill.
Atkins & Co., E. C., 424 So. Illinois St., Indianapolis, Ind.
Barnes Co., Inc., W. O., 1297 Terminal Ave., Detroit, Mich.
Boice Crane Co., Toledo, Ohio

SAWS, BAND—(Cont.)
Champion Blower and Forge Co., Harrisburg Ave., Lancaster, Pa.
Clemson Bros., Inc., 22 Cottage St., Middletown, N. Y.
Delta Mfg. Co., Vienne Ave., Milwaukee, Wis.
Disston & Sons, Inc., Henry, Tacony, Philadelphia, Pa.
Grobet File Corp. of America, 3 Park Place, New York
Wm. Laidlaw Inc., 7 Greenwich St., Belmont, N. Y.
Marburg Brothers, Inc., 90 West St., New York, N. Y.
Oliver Machinery Co., Grand Rapids, Mich.
Racine Tool & Machine Co., 1751 State St., Racine, Wis.
Joseph T. Ryerson & Son, Inc., 2558 W. 16th St., Chicago, Ill.
Victor Saw Works, Inc., 22 Cottage St., Middletown, N. Y.
Walls Sales Corp., 96 Warren St. New York
Wells Manufacturing Corp., 315 Seventh Ave., Three Rivers, Mich.

SAWS, Circular, Metal Cutting
Atkins & Co., E. C., 424 So. Illinois St., Indianapolis, Ind.
Barber-Colman Co., Rockford, Ill.
Brown & Sharpe Mfg. Co., Providence, R. I.
Cochrane-Bly Co., 15 St. James Place, Rochester, N. Y.
DeWalt Products Co., Lancaster, Pa.
Disston & Sons, Inc., Henry, Tacony, Philadelphia, Pa.
Earle Gear & Machine Co., 4723 Stenton Ave., Philadelphia, Pa.
Gorham Tool Co., 14400 Woodrow Wilson Ave., Detroit, Mich.
Ideal Commutator Dresser Co., Sycamore, Ill.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
Michigan Tool Co., Detroit, Mich.
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
National Twist Drill & Tool Co., 6522 Brush St., Detroit, Mich.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Standard Tool Co., The, 6918 Central Ave., Cleveland, Ohio
Tabor Mfg. Co., 6225 Tacony St., Philadelphia, Pa.
Union Twist Drill Co., Athol, Mass.

SAWS, Circular, Wood Cutting
Atkins & Co., E. C., 424 So. Illinois St., Indianapolis, Ind.
Boice Crane Co., Toledo, Ohio
Curtis Pneumatic Machinery Co., 1924 Kemlen Ave., St. Louis, Mo.
DeWalt Products Corp., Fountain Ave., Lancaster, Pa.
Disston & Sons, Inc., Henry, Tacony, Philadelphia, Pa.
Greenlee Bros. & Co., Twelfth Street and Columbia Ave., Rockford, Ill.
Mattison Machine Works, Blackhawk Park Ave. and C. B. & Q. Tracks, Rockford, Ill.
Michigan Tool Co., Detroit, Mich.
Oliver Machinery Co., Grand Rapids, Mich.

SAWS, Hack, Blades (see Hack Saw Blades)

SAWS, Hack, Frames and Blades
Armstrong-Blum Mfg. Co., 333 N. Francisco Ave., Chicago, Ill.
Atkins & Co., E. C., 424 So. Illinois St., Indianapolis, Ind.
Barnes Co., Inc., W. O., 1297 Terminal Ave., Detroit, Mich.
Disston & Sons, Inc., Henry, Tacony, Philadelphia, Pa.
Marburg Brothers, Inc., 90 West St., New York, N. Y.
Racine Tool & Machine Co., 1751 State St., Racine, Wis.
Starrett Co., The L. S., Crescent St., Athol, Mass.

SAWS, Hole
Armstrong-Blum Mfg. Co., 333 N. Francisco Ave., Chicago, Ill.
Atkins & Co., E. C., 424 So. Illinois St., Indianapolis, Ind.
Black & Decker Mfg. Co., Townson, Md.
Van Dorn Electric Tool Co., 716 Joppa Road, Townson, Md.

SAWS, Milling
Atkins & Co., E. C., 424 So. Illinois St., Indianapolis, Ind.
Barber-Colman Co., River & Loomis Sts., Rockford, Ill.
Brown & Sharpe Mfg. Co., Providence, R. I.
Disston & Sons, Inc., Henry, Tacony, Philadelphia, Pa.
Gorham Tool Co., 14400 Woodrow Wilson Ave., Detroit, Mich.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
Ingersoll Milling Machine Co., Rockford, Ill.
Michigan Tool Co., Detroit, Mich.
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
National Twist Drill & Tool Co., 6522 Brush St., Detroit, Mich.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Standard Tool Co., The, 6918 Central Ave., Cleveland, Ohio
Stuart & Co., D. A., 2727 So. Troy St., Chicago, Ill.
Wesson Co., Detroit, Mich.

SAWS, Portable Electric
Atkins & Co., E. C., 424 So. Illinois St., Indianapolis, Ind.
Black & Decker Mfg. Co., Towson, Md.
DeWalt Products Corp., Fountain Ave., Lancaster, Pa.
Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill.
Ingersoll-Rand Co., 11 Broadway, New York, N. Y.
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
Porter-Cable Machine Co., 1725 N. Salina St., Syracuse, N. Y.
Skilsaw, Inc., 3310 Elston Ave., Chicago, Ill.
Speedway Mfg. Co., 1834 So. 52nd Ave., Cicero, Ill.
United States Electrical Tool Co., 2488 W. 6th St., Cincinnati, Ohio
Van Dorn Electric Tool Co., 716 Joppa Road, Towson, Md.
Wells Manufacturing Corp., 315 Seventh Ave., Three Rivers, Mich.

SAWS, Screw Slotting
Atkins & Co., E. C., 424 So. Illinois St., Indianapolis, Ind.
Barber Colman Co., Rockford, Ill.
Brown & Sharpe Mfg. Co., Providence, R. I.
Disston & Sons, Inc., Henry, Tacony, Philadelphia, Pa.
Gorham Tool Co., 14400 Woodrow Wilson Ave., Detroit, Mich.
Greenfield Tap & Die Corp., Sanderson St., Greenfield, Mass.
Michigan Tool Co., Detroit, Mich.
National Twist Drill & Tool Co., 6522 Brush St., Detroit, Mich.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Standard Tool Co., The, 6918 Central Ave., Cleveland, Ohio
Union Twist Drill Co., Athol, Mass.

SCALES
Brown & Sharpe Mfg. Co., Providence, R. I.
Exact Weight Scale Co., Columbus, Ohio
Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill.
Lufkin Rule Co., Saginaw, Mich.
Mico Instrument Co., 10 Arrow St., Cambridge, Mass.
Starrett Co., The L. S., Crescent St., Athol, Mass.

SCALES, Drafting
Universal Drafting Machine Co., 1426 West Third St., Cleveland, Ohio

SCALING HAMMERS, Pneumatic
Champion Blower and Forge Co., Harrisburg Ave., Lancaster, Pa.
Chicago Pneumatic Tool Co., 6 East 44th St., New York, N. Y.
Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill.
Ingersoll-Rand Co., 11 Broadway, New York

SCRAPING MACHINES
Anderson Bros. Mfg. Co., Rockford, Ill.

SCREENS, Woven Wire
Wickwire Spencer Steel Co., New York City

SCREW DRIVERS, Automatic
Bodine Corp., 1720 Fairfield Ave., Bridgeport, Conn.
Detroit Power Screwdriver Co., 5365 Rohns Ave., Detroit, Mich.
Errington Mechanical Laboratory, 24 Norwood Ave., Stapleton, Staten Island, N. Y.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.

SCREW DRIVERS, Flexible Shaft
Haskins Co., R. G., 4630 W. Fulton St., Chicago, Ill.
Charles L. Jarvis Co., Gildersleeve Conn.
Strand Co., N. A., 5001 No. Lincoln St., Chicago, Ill.

SCREW DRIVERS for Portable Tools
Apex Machine and Tool Co., Dayton, Ohio

SCREW DRIVERS, Hand
American Swiss File & Tool Co., Elizabeth, N. J.
Bonney Forge and Tool Works, Allentown, Pa.

SCREW DRIVERS, Portable Electric & Pneumatic
Black & Decker Mfg. Co., Towson, Md.
Buckeye Portable-Tool Co., 29 West Apple St., Dayton, Ohio
Chicago Pneumatic Tool Co., 6 East 44th St., New York, N. Y.
Independent Pneumatic Tool Co., Chicago, Ill.
Ingersoll-Rand Co., 11 Broadway, New York
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
Speedway Mfg. Co., 1834 So. 52nd Ave., Cicero, Ill.
Van Dorn Electric Tool Co., 716 Joppa Road, Towson, Md.

SCREW EXTRACTORS
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio
Greenfield Tap & Die Corp., Sanderson St., Greenfield, Mass.
Standard Tool Co., The, 6918 Central Ave., Cleveland, Ohio

SCREW-MACHINE WORK (see also Contract Work)
Brown & Sharpe Mfg. Co., Providence, R. I.
Eastern Machine Screw Corp., Truman & Barclay Sts., New Haven, Conn.
Lempco Products Inc., Dunham Road, Bedford, Ohio
Link-Belt Co., 307 No. Michigan Ave., Chicago, Ill.
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
National Acme Co., Cleveland, Ohio
Standard Pressed Steel Co., Jenkintown, Pa.
Wicaco Machine Corp., Stenton Ave., Philadelphia, Pa.

SCREW MACHINES, Automatic
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland Automatic Machine Co., Cleveland, Ohio
Cone Automatic Machine Co., Windsor, Vt.
Davenport Machine Tool Co., 167 Ames St., Rochester, N. Y.
Greenlee Bros. & Co., Twelfth Street and Columbia Ave., Rockford, Ill.
Modern Collette & Machine Co., 401 Salliotte St., Ecorse, Detroit, Mich.
National Acme Co., Cleveland, Ohio
New Britain-Gridley Machine Div. New Britain Machine Co., 140 Chestnut St., New Britain, Conn.
Windsor Automatic Co. Inc., Depot Ave., Windsor, Vt.

SCREW MACHINES Plain and Hand
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland Automatic Machine Co., Cleveland, Ohio
Foster Machine Co., 1100 Beasley Ave., Elkhart, Ind.
Gisholt Machine Co. 1201 E. Washington Ave., Madison, Wis.
Modern Collett & Machine Co., 401 Salliotte St., Ecorse, Detroit, Mich.
National Acme Co., Cleveland, Ohio
Stark Tool Co., Waltham, Mass.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio

SCREW MACHINES, Plain and Hand, Bench Type
Ames Co., B. C. Waltham, Mass.
Hardinge Brothers, Inc., Elmira, N. Y.
Rivett Lathe & Grinder Co., Inc., 20 Riverview Rd., Brighton, Boston, Mass.

SCREW PLATES
Butterfield Div. (Union Twist Drill Co.), Derby Line, Vt.
S. W. Card Mfg. Co. (Div. Union Twist Drill), Mansfield, Mass.
Greenfield Tap & Die Corp., Sanderson St., Greenfield, Mass.
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
Pratt & Whitney Co., 436 Capitol Ave., Hartford, Conn.
Union Twist Drill Co., Athol, Mass.

SCREW PRESSES
Dunning & Boschert Press Co., Inc., 390 W. Water St., Syracuse, N. Y.
Perkins Machine Co., Warren, Mass.
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.

SCREW SLOTTING
Stark Tool Co., Waltham, Mass.
Union Twist Drill Co., Athol, Mass.

SCREW THREAD, Locking
Dardelet Threadlock Corp., 120 Broadway, N. Y.

SCREWS, Cap and Set
Allen Mfg. Co., Hartford, Conn.
Baumbach Mfg. Co., E. A., Chicago, Ill.
Bristol Company, Waterbury, Conn.
Danly Machine Specialties Inc., Chicago, Ill.
Dardelet Threadlock Corp., 120 Bdway, N. Y.
Holo-Krome Screw Corp., The, Hartford, Conn.
National Acme Co., Cleveland, Ohio
Standard Pressed Steel Co., Jenkintown, Pa.
Strong, Carlisle & Hammond Co., 1392 West Third St., Cleveland, Ohio

SCREWS, Machine
Allen Mfg. Co., Hartford, Conn.
Bristol Company, Waterbury, Conn.
Dardelet Threadlock Corp., 120 Bdway, N. Y.
Holo-Krome Screw Corp., Hartford, Conn.

SCREWS, Safety
Dardelet Threadlock Corp., 120 Bdway, N. Y.
Holo-Krome Screw Corp., The, Hartford, Conn.
Standard Pressed Steel Co., Jenkintown, Pa.
Strong, Carlisle & Hammond Co., 1392 West Third St., Cleveland, Ohio

SCRIBERS
Brown & Sharpe Mfg. Co., Providence, R. I.
Ford Motor Co., Johansson Div., 3674 Schaefer Rd., Dearborn, Mich.

SCRIBERS—(Cont.)
Lufkin Rule Co., Saginaw, Mich.
Starrett Co., The L. S., Crescent St., Athol, Mass.

SELF-OPENING DIE HEADS (see Die Heads)

SEPARATORS, Centrifugal
DeLaval Steam Turbine Co., Trenton, N. J.
National Acme Co., Cleveland, Ohio
Tolhurst Div. of American Machine & Metals Mfg. Corp., Troy, N. Y.

SEALING COMPOUND
Fostoria Pressed Steel Co., Fostoria, Ohio

SEPARATORS, Magnetic
Cutler Hammer Inc., Milwaukee, Wis.
Stearns Magnetic Mfg. Co., Milwaukee, Wis.

SHAFTING
American Brass Co., Waterbury, Conn.
Bliss & Laughlin Inc., Harvey, Ill.
Earle Gear & Mach. Co., 4707 Stenton Ave., Philadelphia, Pa.
Heppenstall Co., 4620 Hatfield St., Pittsburgh, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Link Belt Co., 2410 W. 18th St., Chicago, Ill.
Power Transmission Council, 1 Atlantic St., Stamford, Conn.
Revere Copper & Brass Corp., 230 Park Ave., New York, N. Y.
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Savage Co., W. J., Clinch Ave. and Tenth St., Knoxville, Tenn.
Union Drawn Steel Co., Massillon, Ohio
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

SHAFTS, Flexible
Earle Gear & Mach. Co., 4707 Stenton Ave., Philadelphia, Pa.
Haskins Co., R. G., 4630 W. Fulton St., Chicago, Ill.
Mall Tool Co., 7740 S. Chicago Ave., Chicago
Strand Co., N. A., 5001 No. Lincoln St., Chicago, Ill.
Swartz & White Mfg. Co., 215 Washington St., Binghamton, N. Y.
White Dental Mfg. Co., S. S., Philadelphia, Pa.

SHAPER-MILLER, Vertical
Cochrane-Bly Co., 15 St. James Place, Rochester, N. Y.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.

SHAPER DRIVES
Cleveland Elec. Motor Co., 5213 Chester Ave., Cleveland, Ohio
Hendey Machine Co., 105 Summer St., Torrington, Conn.

SHAPER, Tools
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Reality Tool Co., Iranistan and Railroad Aves., Bridgeport, Conn.

SHAPERS
American Tool Works Co., Pearl & Eggleston Aves., Cincinnati, Ohio
Ames Co., B. C., Waltham, Mass.
Atkins & Co., E. C., 424 So. Illinois St., Indianapolis, Ind.
Bryant Machinery & Engrg. Co., 400 W. Madison St., Chicago, Ill.
Cincinnati Shaper Co., Cincinnati, Ohio
Columbia Machine Tool Company, 1798 Fairgrove Ave., Hamilton, Ohio
Gould & Eberhardt, 480 Chancellor Ave., Irvington, N. J.
Hendey Machine Co., 105 Summer St., Torrington, Conn.
Index Machinery Corp., 49 Central Ave., Cincinnati, Ohio
Morton Mfg. Co., Muskegon Heights, Mich.
Ohio Machine Tool Co., Kenton, Ohio
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Reed-Prentice Co., 077 Cambridge St., Worcester, Mass.
Rockford Machine Tool Co., Rockford, Ill.
Schuyler, V. A., 250 W. 57th St., New York
Smith & Mills Co., Cincinnati, Ohio
Steege Machinery Co., Chicago, Ill.

SHAPERS, Draw-Cut
Morton Mfg. Co., Muskegon Heights, Mich.

SHAPERS, Vertical
Ames Co., B. C., Waltham, Mass.
Cochrane-Bly Co., 15 St. James Place, Rochester, N. Y.
Columbia Machine Tool Co., 1798 Fairgrove Ave., Hamilton, Ohio
Hanson-Whitney Machine Co., 169 Bartholomew Ave., Hartford, Conn.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.

SHAPES, Cold Drawn
Ideal Foundry & Machine Co., Beaver Falls, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Union Drawn Steel Co., Massillon, Ohio
Universal Steel Co., Bridgeville, Pa.
Wyckoff Drawn Steel Co., Box 1256, First National Bank Bldg., Pittsburgh, Pa.

SHAPES, Structural Steel
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh, Pa., and Chicago, Ill.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Republic Steel Corp., Repubic Bldg., Cleveland, Ohio
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.

SHARPENING MACHINES, Cutter
Barber Colman Co., Rockford, Ill.
Cincinnati Milling Machine Co., Cincinnati
Fellows Gear Shaper Co., 78 River St., Springfield, Vermont
Oliver Instrument Co., Adrian, Mich.

SHARPENING MACHINES, Saw
Atkins, E. C. and Co., 402 S. Illinois St., Indianapolis, Ind.
Cochrane-Bly Co., 15 St. James Place, Rochester, N. Y.
Hanchett Mfg. Co., 906 North State St., Big Rapids, Mich.

SHARPENING STONES
Carborundum Co., Niagara Falls, N. Y.
Norton Company, Worcester, Mass.

SHAVING TOOLS
Colonial Broach Co., Detroit, Mich.
Detroit Tap & Tool Co., Detroit, Mich.
Ex-Cell-O Aircraft and Tool Corp., 1200 Oakman Blvd., Detroit, Mich.
Gorham Tool Co., 14400 Woodrow Wilson Ave., Detroit, Mich.
Michigan Tool Co., Detroit, Mich.

SHEAR KNIVES
Atkins & Co., E. C., 424 So. Illinois St., Indianapolis, Ind.
Cincinnati Shaper Co., Cincinnati, Ohio
Cleveland Punch & Shear Works Co., East 40th & St. Clair Ave., Cleveland, Ohio
Colonial Broach Co., Detroit, Mich.
Columbia Machine Tool Co., 1790 Fairgrove Ave., Hamilton, O.
Detroit Tap & Tool Co., Detroit, Mich.
Disston and Sons, Henry, Inc., Tacony St., Philadelphia, Pa.
Haynes Stellite Co., Kokomo, Indiana
Hendley and Whittemore Co., 10 S. State St., Beloit, Wis.
Heppenstall Co., 4620 Hatfield St., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Michigan Tool Co., Detroit, Mich.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Peck, Stow & Wilcox Co., Southington, Mass.
Rock River Machine Co., Janesville, Wis.

SHEARS, Hand
Buffalo Forge Co., 448 Broadway, Buffalo, N. Y.
Canton Fdry. & Mach. Co., 6400 Breakwater Ave., Cleveland, Ohio
Champion Blower and Forge Co., Harrisburg Ave., Lancaster, Pa.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Helwig Mfg. Co., St. Paul, Minn.
Hendley and Whittemore Co., 10 S. State St., Beloit, Wis.
Marburg Brothers, Inc., 90 West St., New York, N. Y.
Marshalltown Mfg. Co., 900 E. Nevada St., Marshalltown, Iowa
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Peck, Stow & Wilcox Co., Southington, Mass.
Rock River Machine Co., Janesville, Wis.
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Service Machine Co., 752 Broadway, Elizabeth, N. J.
Whitney Metal Tool Co., Rockford, Ill.

SHEARS, Power
Beatty Machine & Mfg. Co., Hammond, Ind.
Bliss Co., E. W., Brooklyn, N. Y.
Buffalo Forge Co., 448 Broadway, Buffalo
Cincinnati Shaper Co., Cincinnati, Ohio
Cleveland Punch & Shear Works Co., East 40th & St. Clair Ave., Cleveland, Ohio
Columbia Machine Tool Co., 1790 Fairgrove Ave., Hamilton, Ohio
Consolidated Machine Tool Corp., Rochester
Helwig Mfg. Co., St. Paul, Minn.
Hendley and Whittemore Co., 10 S. State St., Beloit, Wis.
Marburg Brothers, Inc., 90 West St., New York, N. Y.
Marshalltown Mfg. Co., 900 E. Nevada St., Marshalltown, Iowa
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Peck, Stow & Wilcox Co., Southington, Mass.
Rock River Machine Co., Janesville, Wis.
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Pels and Co., Henry, New York, N. Y.
Service Machine Co., 752 Broadway, Elizabeth, N. J.
Stanley Elec. Tool Div. of Stanley Works, New Britain, Conn.
Steege Machy. Co., Chicago, Ill.
United Engrg. & Fdry Co., Pittsburgh, Pa.
Wickes Bros., 512 No. Water St., Saginaw, Mich.
Williams, White & Co., Moline, Ill.

SHEARS, Rotary
Bliss Co., E. W., Brooklyn, N. Y.
Colonial Broach Co., Detroit, Mich.
Detroit Tap & Tool Co., Detroit, Mich.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill
Marshalltown Mfg. Co., 900 E. Nevada St., Marshalltown, Iowa
Mesta Machine Co., P. O. Box 1466, Pittsburgh Pa.
Michigan Tool Co., Detroit, Mich.
Niagara Machine & Tool Works 637-697 Northland Ave., Buffalo, N. Y.
Peck, Stow & Wilcox Co., Southington, Mass.
Quickwork Co., St. Mary's, Ohio
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
United Engrg. & Fdry Co., Pittsburgh, Pa.
Williams, White & Co., Moline, Ill.

SHEARS, Squaring
Bliss Co., E. W., Brooklyn, N. Y.
Cincinnati Shaper Co., Cincinnati, Ohio
Cleveland Punch & Shear Works Co., East 40th and St. Clair Ave., Cleveland, Ohio
Columbia Machine Tool Co., 1790 Fairgrove Ave., Hamilton, Ohio
Consolidated Machine Tool Corp., Rochester, N. Y.
Dodge Mfg. Corp., Mishawaka, Ind.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Peck, Stow & Wilcox Co., Southington, Mass.
Rock River Machine Co., Janesville, Wis
United Engrg. & Fdry Co., Pittsburgh, Pa.

SHEAVES, Belt
Dodge Mfg. Corp., Mishawaka, Ind.
Earle Gear & Machine Co., 4723 Stenton Ave., Philadelphia, Pa.
Gates Rubber Co., Denver, Colo.
Goodrich Co., B. F., 576 South Main St., Akron, Ohio
Hanson Clutch & Machinery Co., Tiffin, Ohio
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.

SHEAVES, V-Belt
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Earle Gear & Machine Co., 4723 Stenton Ave., Philadelphia, Pa.
Foote Gear Works, Inc., 1301 South Cicero Ave., Cicero, Ill.
Gates Rubber Co., Denver, Colo.
Goodrich Co., B. F., 576 South Main St., Akron, Ohio
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Winfield H. Smith, Inc., Springville, Erie County, N. Y.

SHEET PROCESSING MACHINES
McKay Machine Co., Youngstown, Ohio

SHEETS, TUBES, and RODS, PHENOLIC
Bakelite Corp., Bound Brook, N. J.
Formica Insulation Co., 4614 Spring Grove Ave., Cincinnati, Ohio
Marburg Brothers, Inc., 90 West St., New York, N. Y.
Synthane Corp., Oaks, Pa.

SHELVING
General Fireproofing Co., Youngstown, Ohio
Lyon Metal Products Co., Aurora, Ill.

SHIMS
Laminated Shim Co., 21-14—44th Ave., Long Island City, N. Y.
Universal Drafting Machine Co., 1426 West Third St., Cleveland, Ohio

SHOP FURNITURE (see Furniture, Machine Shop)

SINE BARS
Ford Motor Co., Johansson Div. 3674 Schaefer Road, Dearborn, Mich.
Taft-Peirce Mfg. Co., The, 32 Mechanic Ave., Woonsocket, R. I.
Van Keuren Co., 12 Copeland St., Watertown, Mass.
Vinco Tool Co., 7850 Central Ave., Detroit

SKIDS (see Platforms, Skid)

SLEEVES
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio.
Hardinge Brothers, Inc., Elmira, N. Y.
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
Standard Tool Co., The, 6918 Central Ave., Cleveland, Ohio

SLIDE RULES
Gould & Eberhardt, 480 Chancellor Ave., Irvington, N. J.
M. Manheim Co., Inc., 15 E. 26th St., New York

SLOTTING ATTACHMENTS, Shapers and Planers
High Speed Hammer Co., Inc., 119 Norton St., Rochester, N. Y.

SLOTTING MACHINES
Baker Bros., Inc., Post St., Toledo, Ohio
Cochrane-Bly., 15 St. James Place, Rochester, N. Y.
Consolidated Machine Tool Corp., Rochester, N. Y.
General Machinery Corp. (Niles Tool Wks. Div.), 545 North Third St., Hamilton, Ohio
Morton Mfg. Co., Muskegon Heights, Mich.
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.

SLUSHING OILS AND COMPOUNDS
Socony-Vacuum Oil Co., New York, N. Y.
Stuart Oil Co., D. A., 2727 So. Troy St., Chicago, Ill.

SOCKETS AND SLEEVES
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio
Greenfield Tap & Die Corp., Sanderson St., Greenfield, Mass.
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
Standard Tool Co., The, 6918 Central Ave., Cleveland, Ohio
Union Twist Drill Co., Athol, Mass.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio

SOLDERING MACHINES
Frampton Electrical Equipment Co., 5th and Norwood, Dayton, Ohio

SOLVENTS FOR OIL AND GREASE
Detroit Rex Products Co., 13005 Hillview Ave., Detroit, Mich.

SPECIAL MACHINERY AND TOOLS (see Contract Work)

SPEED INCREASES
Adams Company, East Fourth Street, Dubuque, Iowa
Cullman Wheel Co., Chicago, Ill.
De Laval Steam Turbine Co., Trenton, N. J.
Earle Gear & Machine Co., 4723 Stenton Ave., Philadelphia, Pa.
Farrel-Birmingham Co., Inc., 355 Vulcan St., Buffalo, N. Y.
Foote Gear Works, Inc., 1301 South Cicero Ave., Cicero, Ill.
Ganschow Gear Co., 1013 W. Washington Blvd. Chicago, Ill.
Gear Specialties, Inc., 2635 Canton St., Chicago, Ill.
Horsburgh & Scott Co., 5114 Hamilton Ave., Cleveland, Ohio
James Mfg. Co., D. O., Chicago, Ill.
Link Belt Co., 2405 W. Hunting Post Ave., Philadelphia, Pa.
Mechanical Specialties, Inc.
Meisel Press Mfg. Co., Boston, Mass.
New Departure Div., General Motors Corp., Bristol, Conn.
Palmer-Bee Co., Westminster and G.T.R.R., Detroit, Mich.
Philadelphia Gear Works, Philadelphia, Pa.

SPEED REDUCERS, Motorized
Adams Company, East Fourth Street, Dubuque, Iowa
Boston Gear Works, Inc., North Quincy, Ill.
Cleveland Elec. Motor Co., 5213 Chester Ave., Cleveland, Ohio
Cullman Wheel Co., 1349 Altgeld St., Chicago, Ill.
Davis & Thompson Co., 6619 West Mitchell St., Milwaukee, Wis.
Earle Gear & Machine Co., 4723 Stenton Ave., Philadelphia, Pa.
Foote Gear Works, Inc., 1301 South Cicero Ave., Cicero, Ill.
Ganschow Gear Co., 1013 Washington Blvd., Chicago, Ill.
Gear Specialties, Inc., 2630 Canton St., Chicago, Ill.
James Mfg. Co., D. O. Chicago, Ill.
Janette Mfg. Co., 556 W. Monroe St., Chicago, Ill.
Link Belt Co., 2405 W. Hunting Post Ave., Philadelphia, Pa.
Mechanical Specialties, Inc., 2630 Canton St., Chicago, Ill.
Meisel Press Mfg. Co., Boston, Mass.
New Departure Div., General Motors Corp., Bristol, Conn.
Ohio Gear Co., 1333 E. 179th St., Cleveland
Philadelphia Gear Works, Philadelphia, Pa.
Palmer-Bee Co., Westminster and G.T.R.R., Detroit, Mich.
Reliance Elec. & Engrg. Co., 1058 Idaho Road, Cleveland, Ohio
Sterling Electric Motors, Telegraph Road, Los Angeles, Calif.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

SPEED REDUCERS, Plain
Adams Company, East Fourth Street, Dubuque, Iowa
Bodine Electric Co., 2264 W. Ohio St., Chicago, Ill.
Boston Gear Works, Inc., North Quincy, Ill.
Colonial Broach Co., Detroit, Mich.
Cullman Wheel Co., 1349 Altgeld St., Chicago, Ill.
Davis & Thompson Co., 6619 West Mitchell St., Milwaukee, Wis.
De Laval Steam Turbine Co., Trenton, N. J.
Earle Gear & Machine Co., 4723 Stenton Ave., Philadelphia, Pa.
Farrel-Birmingham Co., Inc., 355 Vulcan St., Buffalo, N. Y.
Foote Gear Work, Inc., 1301 South Cicero Ave., Cicero, Ill.
Ganschow Gear Co., 1013 Washington Blvd., Chicago, Ill.
Gear Specialties, Inc., 2630 Canton St., Chicago, Ill.
General Machinery Corp. (Niles Tool Wks. Div.), 545 North Third St., Hamilton, Ohio
Grant Gear Works, Inc., 154 W. Second St., South Boston, Mass.
Horsburgh & Scott Co., 5114 Hamilton Ave., Cleveland, Ohio
James Mfg. Co., D. O., Chicago, Ill.
Janette Mfg. Co., 556 W. Monroe St., Chicago, Ill.
Mechanical Specialties, Inc., 2630 Canton St., Chicago, Ill.
Meisel Press Mfg. Co., Boston, Mass.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Michigan Tool Co., Detroit, Mich.
Morse Chain Co., Ithaca, N. Y.
Ohio Gear Co., 1333 E. 179th St., Cleveland
Palmer-Bee Co., Westminster and G.T.R.R., Detroit, Mich.
Philadelphia Gear Works, Philadelphia, Pa.
Sier-Bath Gear Co., New York, N. Y.
Smith, Inc., Winfield H., Springville, Erie County, New York
United Engrg. & Fdry. Co., Pittsburgh, Pa.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

SPINDLES, Hollow Bored
American Hollow Boring Co., 19th and Raspberry Sts., Erie, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.

SPINDLES, Motorized
Majestic Tool & Mfg. Co., Detroit, Mich.

SPLINE GAGES
National Broach Machine Co., 11455 Shoemaker Ave., Detroit, Mich.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Sheffield Gage Corp., Dayton, Ohio
Standard Gage Co., Inc., Poughkeepsie, N. Y.
Vinco Tool Co., 7350 Central Ave., Detroit

SPOT WELD TIMERS
Cutler Hammer Inc., Milwaukee, Wis.
Electric Controller & Mfg. Co., 2700 East 79th St., Cleveland, Ohio
Square D Electric Co., 710 S. 3rd St., Milwaukee, Wis.
Ward Leonard, Elec. Co., Mount Vernon, N. Y.

SPRAY PAINTING EQUIPMENT
Binks Mfg. Co., 3114 Carroll Ave., Chicago

SPRING WASHERS
American Nut & Bold Fastener Co., Pittsburgh, Pa.
Beall Tool Co., East Alton, Ill.
Butcher & Hart Mfg. Co., Toledo, Ohio
Eaton Mfg. Co., Massillon, Ohio
Hobbs Mfg. Co., Worcester, Mass.
Philadelphia Steel & Wire Corp., Germantown, Phila., Pa.
National Lock Washer Company, Newark, N. J., and Milwaukee, Wis.
Positive Lock Washer Co., Newark, N. J.
Washburn Company, Worcester, Mass.

SPRING WIRE
American Brass Co., Waterbury, Conn.
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.
Detroit Tap & Tool Co., Detroit, Mich.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Page Steel & Wire Div. Amer. Chain & Cable Co., Inc., Monessen, Pa.
Pittsburgh Steel Co., Union Trust Bldg., Pittsburgh, Pa.
Revere Copper & Brass Corp., 230 Park Ave., New York, N. Y.

SPRINGS, Extension, Compression, Torsion or Flat
Wickwire Spencer Steel Co., New York City

SPROCKETS
Adams Company, East Fourth St., Dubuque, Iowa
Bilgram Gear & Machine Works, 1235 Spring Garden St., Philadelphia, Pa.
Boston Gear Works, Inc., North Quincy, Ill.
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Gear Co., 1825 Reading Road, Cincinnati, Ohio
Cullman Wheel Co., 1349 Altgeld St., Chicago, Ill.
Dodge Mfg. Corp., Mishawaka, Ind.
Earle Gear & Machine Co., 4723 Stenton Ave., Philadelphia, Pa.
Grant Gear Works, Inc., 154 W. Second St., South Boston, Mass.
Horsburgh & Scott Co., 5114 Hamilton Ave., Cleveland, Ohio
James Mfg. Co., D. O., Chicago, Ill.
Link-Belt Co., 300 W. Pershing Rd., Chicago
Massachusetts Gear & Tool Co., 25 Nashua St., Woburn, Mass.
Meisel Press Mfg. Co., Boston, Mass.
Morse Chain Co., Ithaca, N. Y.
Philadelphia Gear Works, Philadelphia, Pa.
Power Transmission Council, 1 Atlantic St., Stamford, Conn.
Savage Co., W. J., 912 Clinch St., Knoxville, Tenn.
Slaysman and Co., 813 E. Pratt St., Baltimore, Md.
Sun Oil Co., Philadelphia, Pa.
Winfield H. Smith, Inc., Springville, Erie County, N. Y.

SQUARES
Brown & Sharpe Mfg. Co., Providence, R. I.
Disston & Sons, Inc., Henry, Tacony, Philadelphia, Pa.
Lufkin Rule Co., The, Saginaw, Mich.
Mico Instrument Co., 10 Arrow St., Cambridge, Mass.
Stanley Tools, New Britain, Conn.
Starrett Co., The L. S., Crescent St., Athol Mass.
Taft-Peirce Mfg. Co., The, 32 Mechanic Ave., Woonsocket, R. I.
Vinco Tool Co., 7350 Central Ave., Detroit, Mich.

STAMPINGS, Fibre
Continental Diamond Fibre Co., Newark, Del.

STAMPINGS, Metal
American Brass Co., Waterbury, Conn.
Benjamin Elec. Mfg. Co., Des Plaines, Ill.
Powell Pressed Steel Co., Hubbard, Ohio
Sundstrand Machine Tool Co., Rockford, Ill.

STAMPS, Steel
Danly Machine Specialties, Inc., Chicago, Ill.
Noble & Westbrook Mfg. Co., 20 Westbrook St., East Hartford, Conn.
Numberall Stamp and Tool Co., Huguenot Park, Staten Island, N. Y.

STARTERS—Automatic A. C. and D. C. (See Controllers and Starters, Motor)

STAYBOLTS
Bethlehem Steel, Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh, Pa.

STEEL, Alloy
Anchor Drawn Steel Co., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin Inc., Harvey, Ill.
Carnegie-Illinois Steel Corp., Pittsburgh, Pa.
Carpenter Steel Co., 109 W. Bern St., Reading, Pa.
Colonial Steel Co., Pittsburgh, Pa.
Columbia Tool Steel Co., 425 E. 14th St., Chicago, Ill.
Disston & Sons, Inc., Henry, Tacony, Philadelphia, Pa.
Driver-Harris Co., Harrison, N. J.
Firth-Sterling Steel Co., McKeesport, Pa.
Heppenstall Co., 4620 Hatfield St., Pittsburgh
Ingersoll Steel & Disc Div. Borg-Warner Corp., P. O. Box 272, Newcastle, Ind.
Jessop Steel Co., Washington, Pa.
Latrobe Electric Steel Co., 2626 S. Ligonier St., Latrobe, Pa.
Ludlum Steel Co., Lock Box 38, Watervliet, N. Y.
Pittsburgh Steel Co., Union Trust Bldg., Pittsburgh, Pa.
Republic Steel Corp., Republic Bldg., Cleveland, Ohio
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Stoody Co., Whittier, Calif.
Timken Steel & Tubes, Inc., Canton, Ohio
Universal Steel Co., Bridgeport, Pa.
Vanadium Alloys Steel Co., 2400 Grant Bl., Pittsburgh, Pa.

STEEL, Alloy, Cold Drawn
Anchor Drawn Steel Co., Pittsburgh, Pa.
Bliss & Laughlin Inc., Harvey, Ill., and Buffalo, N. Y.
Carpenter Steel Co., 109 W. Bern St., Reading, Pa.
Colonial Steel Co., Pittsburgh, Pa.
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.
Driver-Harris Co., Harrison, N. J.
Ideal Foundry & Machine Co., Beaver Falls, Pa.
Jessop Steel Co., Washington, Pa.
Latrobe Electric Steel Co., 2626 S. Ligonier St., Latrobe, Pa.
Ludlum Steel Co., Lock Box 38, Watervliet, N. Y.
Pittsburgh Steel Co., Union Trust Bldg., Pittsburgh, Pa.
Ryerson & Co. Inc., Jos. T., 16th and Rockwell Sts, Chicago, Ill.
Timken Steel & Tubes, Inc., Canton, Ohio
Union Drawn Steel Co., Massillon, Ohio
Universal Steel Co., Bridgeville, Pa.
Vanadium Alloys Steel Co., 2400 Grant Bldg., Pittsburgh, Pa.
Wyckoff Drawn Steel Co., Box 1256, First National Bank Bldg., Pittsburg, Pa.

STEEL, Carbon
Anchor Drawn Steel Co., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin Inc., Harvey, Ill.
Carnegie-Illinois Steel Corp., Pittsburgh, Pa.
Colonial Steel Co., Pittsburgh, Pa.
Columbia Tool Steel Co., 425 E. 14th St., Chicago, Ill.

STEEL, Carbon (Cont.)
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.
Disston & Sons, Inc., Henry, Tacony, Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Heppenstall Co., 4620 Hatfield St., Pittsburgh
Jessop Steel Co., Washington, Pa.
Jones & Lamson Machine Co., Springfield, Vt.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Latrobe Electric Steel Co., 2626 S. Ligonier St., Lathrobe, Pa.
Monarch Steel Co., Indianapolis, Ind.
Pittsburgh Steel Co., Union Trust Bldg., Pittsburgh, Pa.
Republic Steel Corp., Republic Bldg., Cleveland, Ohio
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Stoody Co., Whittier, Calif.
Timken Steel & Tubes, Inc., Canton, Ohio
Universal Steel Co., Bridgeville, Pa.
Vanadium Alloys Steel Co., 2400 Grant Bl., Pittsburgh, Pa.

STEEL, Cold Drawn
Anchor Drawn Steel Co., Pittsburgh, Pa.
Bliss & Laughlin Inc., Harvey, Ill., and Buffalo, N. Y.
Colonial Steel Co., Pittsburgh, Pa.
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.
Firth-Sterling Steel Co., McKeesport, Pa.
Ideal Foundry & Machine Co., Beaver Falls, Pa.
Jessop Steel Co., Washington, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Latrobe Electric Steel Co., 2626 S. Ligonier St., Latrobe, Pa.
Monarch Steel Co., Indianapolis, Ind.
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Timken Steel & Tubes, Inc., Canton, Ohio
Union Drawn Steel Co., Massillon, Ohio
Universal Steel Co., Bridgeville, Pa.
Vanadium Alloys Steel Co., 2400 Grant Bl., Pittsburgh, Pa.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

STEEL, Cold Rolled
American Rolling Mill Co., Curtis Ave., Middletown, Ohio
American Sheet & Tin Plate Co., Pittsburgh
American Tube & Stamping Co., New Britain, Conn.
Carnegie-Illinois Steel Corp., Pittsburgh, Pa., and Chicago, Ill.
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.
Disston & Sons, Inc., Henry, Tacony, Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Jessop Steel Co., Washington, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Latrobe Electric Steel Co., 2626 Ligonier St., Latrobe, Pa.
Republic Steel Corp., Republic Bldg., Cleveland, Ohio
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Savage Co., W. J., Clinch Ave. and Tenth St., Knoxville, Tenn.
Thomas Steel Co., Warren, Ohio
Timken Steel & Tubes, Inc., Canton, Ohio
Universal Steel Co., Bridgeville, Pa.

STEEL, Die
Anchor Drawn Steel Co., Pittsburgh, Pa.
Carpenter Steel Co., 109 W. Bern St., Reading, Pa.
Colonial Steel Co., Pittsburgh, Pa.
Columbia Tool Steel Co., 425 E. 14th St., Chicago, Ill.
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.
Driver-Harris Co., Harrison, N. J.
Firth-Sterling Steel Co., McKeesport, Pa.
Heppenstall Co., 4620 Hatfield St., Pittsburgh
Jessop Steel Co., Washington, Pa.
Latrobe Electric Steel Co., 2626 S. Ligonier St., Latrobe, Pa.
Ludlum Steel Co., Lock Box 38, Watervliet, N. Y.
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Timken Steel & Tubes, Inc., Canton, Ohio
Universal Steel Co., Bridgeville, Pa.
Vanadium Alloy Steel Co., 2400 Grant Bl., Pittsburgh, Pa.

STEEL, Electrical, Strip and Sheet
American Rolling Mill Co., Curtis Ave., Middletown, Ohio
American Sheet & Tin Plate Co., Pittsburgh
Carnegie-Illinois Steel Corp., Pittsburgh, Pa., and Chicago, Ill.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Republic Steel Corp., Republic Bldg., Cleveland, Ohio

STEEL, High Speed
Anchor Drawn Steel Co., Pittsburgh, Pa.
Armstrong Bros. Tool Co., 315 N. Francisco Ave, Chicago, Ill.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin Inc., Harvey, Ill.
Carpenter Steel Co., 109 W. Bern St., Reading, Pa.
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio
Colonial Steel Co., Pittsburgh, Pa.
Columbia Tool Steel Co., 425 E. 14th St., Chicago, Ill.
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.
Disston & Sons, Inc., Henry, Tacony, Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Ingersoll Steel & Disc Div. Borg-Warner Corp., P. O. Box 272, Newcastle, Ind.
Jessop Steel Co., Washington, Pa.
Latrobe Electric Steel Co., 2626 S. Ligonier St., Latrobe, Pa.
Ludlum Steel Co., Lock Box 38, Watervliet, N. Y.
Republic Steel Corp., Republic Bldg., Cleveland, Ohio
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Il.
Stoody Co., Whittier, Calif.
Timken Steel & Tubes, Inc., Canton, Ohio
Universal Steel Co., Bridgeville, Pa.
Vascoloy Ramet Div. of Vanadium Alloys Steel Co., No. Chicago, Ill.

STEEL, Magnet
Carnegie-Illinois Steel Corp., Pittsburgh, Pa.
Carpenter Steel Co., 109 W. Bern St., Reading, Pa.
Jessop Steel Co., Washington, Pa.
Latrobe Electric Steel Co., 2626 Ligonier St., Latrobe, Pa.
Ludlum Steel Co., Lock Box 38, Watervliet, N. Y.
Republic Steel Corp., Republic Bldg., Cleveland, Ohio

STEEL, Screw
Bliss & Laughlin Inc., Harvey, Ill., and Buffalo, N. Y.
Carnegie-Illinois Steel Corp., Pittsburgh, Pa.
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.
Disston & Sons, Inc., Henry, Tacony, Philadelphia, Pa.
Ideal Foundry & Machine Co., Beaver Falls, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Monarch Steel Co., Indianapolis, Ind.
Pittsburgh Steel Co., Union Trust Bldg., Pittsburg, Pa.
Ryerson & Co., Inc. Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Timken Steel & Tubes, Inc., Canton, Ohio
Union Drawn Steel Co., Massillon, Ohio
Universal Steel Co., Bridgeville, Pa.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

STEEL, Sheets
American Rolling Mill Co., Curtis Ave., Middletown, O.
American Sheet & Tin Plate Co., Pittsburgh, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh, Pa. and Chicago, Ill.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Joseph T. Ryerson & Son Inc., 2558 W. 16th St., Chicago, Ill.

STEEL, Stainless
American Rolling Mill Co., Curtis Ave., Middletown, Ohio
American Sheet & Tin Plate Co., Pittsburgh
Anchor Drawn Steel Co., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh, Pa.
Carpenter Steel Co., 109 W. Bern St., Reading, Pa.
Colonial Steel Co., Pittsburgh, Pa.
Columbia Tool Steel Co., 425 E. 14th St., Chicago, Ill.
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.
Disston & Sons, Inc., Henry, Tacony, Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Ideal Foundry & Machine Co., Beaver Falls, Pa.
Ingersoll Steel & Disc Div. Borg-Warner Corp., P. O. Box 272, Newcastle, Ind.
Jessop Steel Co., Washington, Pa.
Latrobe Electric Steel Co., 2626 S. Ligonier St., Latrobe, Pa.
Ludlum Steel Co., Lock Box 38, Watervliet, N. Y.
Pittsburgh Steel Co., Union Trust Bldg., Pittsburgh, Pa.
Republic Steel Corp., Republic Bldg., Cleveland, Ohio
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Savage Co., W. J., Clinch Ave. and Tenth St., Knoxville, Tenn.
Steel & Tubes, Inc. (Sub. of Republic Steel Corp.), Cleveland, Ohio
Timken Steel & Tubes, Inc., Canton, Ohio
Union Drawn Steel Co., Massillon, Ohio
Universal Steel Co., Bridgeville, Pa.
Vanadium Alloys Steel Co., 2400 Grant Bl., Pittsburgh, Pa.

STEEL, Strip
American Rolling Mill Co., Curtis Ave., Middletown, O.
American Sheet & Tin Plate Co., Pittsburgh
Carnegie-Illinois Steel Corp., Pittsburgh, Pa.
Crucible Steel Co., of America, 405 Lexington Ave., New York, N. Y.
Disston & Sons, Inc., Henry, Tacony, Philadelphia, Pa.
Driver-Harris Co., Harrison, N. J.
Jessop Steel Co., Washington, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Republic Steel Corp., Republic Bldg., Cleveland, Ohio
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Thomas Steel Co., Warren, Ohio
Universal Steel Co., Bridgeville, Pa.

STEEL, Tool
Anchor Drawn Steel Co., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carpenter Steel Co., 109 W. Bern St., Reading, Pa.
Colonial Steel Co., Pittsburgh, Pa.
Columbia Tool Steel Co., 425 E. 14th St., Chicago, Ill.
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.
Disston & Sons, Inc., Henry, Tacony, Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Heppenstall Co., 4620 Hatfield St., Pittsburgh,
Ingersoll Steel & Disc. Div. Borg-Warner Corp., P. O. Box 272, Newcastle, Ind.
Jessop Steel Co., Washington, Pa.
Latrobe Electric Steel Co, 2626 S. Ligonier St., Latrobe, Pa.
Ludlum Steel Co., Lock Box 38, Watervliet, N. Y.
Republic Steel Corp., Republic Bldg., Cleveland, Ohio
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Universal Steel Co., Bridgeville, Pa.
Vanadium Alloys Steel Co., 2400 Grant Bl., Pittsburgh, Pa.

STOCKS, Die
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Beaver Pipe Tools Inc., 1937 Amma Ave., Warren, Ohio
Butterfield Div. (Union Twist Drill Co.) Derby Line, Vt.
S. W. Card Mfg. Co. (Div. Union Twist Drill Co.), Mansfield, Mass.
Champion Blower and Forge Co, Harrisburg Ave., Lancaster, Pa.
Greenfield Tap & Die Corp., Sanderson St., Greenfield, Mass.
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
Oster Mfg. Co., The, 2057 East 61st Place, Cleveland, Ohio
Pratt & Whitney Co., 436 Capitol Ave., Hartford, Conn.
Standard Tool Co., The, 6918 Central Ave., Cleveland, Ohio
Toledo Pipe Threading Machine Co., 1445 Summit St., Toledo, Ohio

STORAGE Batteries, Electric
Electric Storage Battery Co., Philadelphia

STRAIGHT EDGES
Atkins, E. C. and Co., 402 S. Illinois St., Indianapolis, Ind.
Brown & Sharpe Mfg. Co., Providence, R. I.
Disston & Sons, Inc., Henry, Tacony, Philadelphia, Pa.
Ford Motor Co., Johansson Div., 3674 Schaefer Rd., Dearborn, Mich.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Peck, Stow & Wilcox Co., Southington, Mass.
Scherr Co., Inc., Geo., 128 Lafayette St., New York, N. Y.
Taft-Peirce Mfg. Co., The, 32 Mechanic Ave., Woonsocket, R. I.

STRAIGHTENING MACHINERY
Chambersburg Engineering Co., Chambersburg, Pa.
Cleveland Punch & Shear Works Co., East 40th & St. Clair Ave., Cleveland, Ohio
Consolidated Machine Tool Corp., Rochester, N. Y.
General Manufacturing Co., 6430 Farnsworth Ave., Detroit, Mich.
Schuyler, W. A., 250 West 57th St., New York, N. Y.

STRAINERS, Coolants and Lubricants (see Filters)

STRIPPER BOLTS, Socket Head
Holo-Krome Screws Corp., The, Bristol, Conn.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Strong, Carlisle & Hammond Co., 1392 West Third St., Cleveland, Ohio

STRIPPER UNITS
Strippit Corp., 1559 Niagra St., Buffalo, N. Y.

STRIPPERS FOR PAINT, LACQUER, AND ENAMEL FINISHES
Detroit Rex Products Co., 13005 Hillview Ave., Detroit, Mich.

STUD SETTERS
Apex Mach. & Tool Co., Dayton, Ohio
Black & Decker Mfg. Co., 716 Pennsylvania Ave., Towson, Md.
Chicago Pneumatic Tool Co., 6 East 44th St., New York, N. Y.
Consolidated Machine Tool Corp., Rochester, N. Y.
Errington Mechanical Laboratory, 24 Norwood Ave., Stapleton, Staten Island, N. Y.
Ingersoll-Rand Co., 11 Broadway, New York
Van Dorn Electric Tool Co., 716 Joppa Road, Towson, Md.

SUB HEADSTOCKS for Engine Lathes
Hendey Machine Co., Torrington, Conn.

SUB PRESS DIES
Waltham Machine Works, Waltham, Mass.

SUB PRESSES and Die Sets
Baumbach Mfg. Co., E. A., Chicago, Ill.
Danly Machine Specialties Inc., Chicago, Ill.
Pratt & Whitney Co., 436 Capitol Ave., Hartford, Conn.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Strippit Corp., 1559 Niagara St., Buffalo, N. Y.
Waltham Machine Works, Waltham, Mass.

SURFACE BROACHING MACHINES
American Broach Machine Co., 415 W. Huron St., Ann Arbor, Mich.
Cincinnati Milling Machine Co. (Cinn-Gardner, Inc.), Cincinnati, Ohio
Foote-Burt Co., The, 13000 St. Clair Ave., Cleveland, Ohio

SURFACE PLATES
Brown & Sharpe Mfg. Co., Providence, R. I.
Canedy-Otto Mfg. Co., Chicago Heights, Ill.
Challenger Mchry. Co., Grand Haven, Mich.
Foster Machine Co., 1100 Beasley Ave., Elkhart, Ind.
Mico Instrument Co., 10 Arrow St., Cambridge, Mass.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Taft-Peirce Mfg. Co., The, 32 Mechanic Ave., Woonsocket, R. I.
U. S. Tool Co., Inc., Ampere, N. J.
Western Tool & Mfg. Co., Springfield, Ohio

SWAGING MACHINES
Atkins & Co., E. C., 424 So. Illinois St., Indianapolis, Ind.
Etna Machine Co., Toledo, Ohio
Hardinge Brothers, Inc., Elmira, N. Y.
Langelier Mfg. Co., 51 Washington Ave., Cranston, R. I.
Torrington Co., The, Field St., Torrington, Conn.

SWITCHBOARDS
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

SWITCHES, Electric
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Arrow-Hart & Hegeman Elec. Co., 103 Hawthorne St., Hartford, Conn.
Burgess Laboratories, C. F., Inc., Freeport, Ill.
Electric Controller & Mfg. Co., 2700 E. 79th St., Cleveland, Ohio
General Electric Vapor Lamp Co., 410 Eighth St., Hoboken, N. J.
Hart Mfg. Co. Hartford, Conn.
Monitor Controller Co., Gay, Lombard and Frederick Sts., Baltimore, Md.
Ohio Brass Co., Mansfield, Ohio
Production Instrument Co., [illegible] So. Wabash Ave., Chicago, Ill.
Savage Co., W. J., Clinch Ave., and Tenth St., Knoxville, Tenn.
Ward Leonard Elec. Co., 37 South St., Mount Vernon, N. Y.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

TABLES, Circular
Cochrane-Bly Co., 15 St. James Place, Rochester, N. Y.
George Gorton Machine Co., 1107 13th St., Racine, Wis.
Knight Machinery Co., W. B., 3920 W. Pine Blvd., St. Louis, Mo.

TACHOMETERS
Bristol Co., Waterbury, Conn.
Foxboro Co., 122 Neponset Ave., Foxboro, Mass.
Scherr Co., Inc., Geo., 128 Lafayette St., New York, N. Y.
Veeder-Root, Inc., Hartford, Conn.
Western Electrical Inst. Corp., 614 Freylinghuysen Ave., Newark, N. J.

TANKS, Quenching
Strong, Carlisle & Hammond Mach. Co., Cleveland, Ohio

TAP EXTRACTORS, Broken
Walton Co., The, Hartford, Conn.

TAP HOLDERS
Baush Machine Tool Co., 156 Wason Ave., Springfield, Mass.
Brown & Sharpe Mfg. Co., Providence, R. I.
Buhr Machine Tool Co., 839 Greene St., Ann Arbor, Mich.
Butterfield Div. (Union Twist Drill Co.), Derby Line, Vt.
S. W. Card Mfg. Co., (Div. Union Twist Drill), Mansfield, Mass.
Champion Blower & Forge Co., Harrisburg Ave., Lancaster, Pa.
Errington Mechanical Laboratory, 24 Norwood Ave., Stapleton, Staten Island, N. Y.
Etteo Tool Co., 594 Johnson Ave., Brooklyn, N. Y.
National Automatic Tool Co., Richmond, Ind.

TAPER PIN REAMERS, (see Reamers, Taper Pin Hole)

TAPER PINS
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
Pratt & Whitney Div., Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Standard Tool Co., The, 6918 Central Ave., Cleveland, Ohio

TAPES, Insulating
Bakelite Corp., Bound Brook, N. J.
Continental Diamond Fibre Co., Newark, Del.
B. F. Goodrich Co., 576 South Main St., Akron, Ohio
Savage Co., W. J., Clinch Ave. and Tenth St., Knoxville, Tenn.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

TAPES, Measuring
Lufkin Rule Co., The, Saginaw, Mich.
Starrett Co., The L. S., Crescent St., Athol, Mass.

TAPPERS, Portable
Black & Decker Mfg. Co., Towson, Md.
Chicago Pneumatic Tool Co., 5 E. 44th St., New York, N. Y.
Independent Pneumatic Tool Co., Chicago, Ill.
Ingersoll-Rand Co., 11 Broadway., N. Y. C.
United States Electrical Tool Co., 2488 W. 6th St., Cincinnati, Ohio
Van Dorn Electric Tool Co., 716 Joppa Road, Towson, Md.
White Dental Mfg. Co., S. S., Philadelphia, Pa.

TAPPING HEADS
Baush Machine Tool Co., 156 Wason Ave., Springfield, Mass.
Boice Crane Co., Toledo, Ohio
Buhr Machine Tool Co., 839 Greene St., Ann Arbor, Mich.
Bradford Machine Tool Co., 657 Evans St., Cincinnati, Ohio
Cross Gear & Machine Co., 3250 Bellevue, Detroit, Mich.
Errington Mechanical Laboratory, 24 Norwood Ave., Stapleton, Staten Island, N. Y.
Etco Tool Co., 594 Johnson Ave., Brooklyn, N. Y.
Foote-Burt Co., The, 13000 St. Clair Ave., Cleveland, Ohio
Greenlee Bros. & Co., Twelfth St. and Columbia Ave., Rockford, Ill.
Hoefer Mfg. Co., 213 S. Chicago Ave., Freeport, Ill.
Charles L. Jarvis Co., Gildersleeve, Conn.
Kingsbury Machine Tool Co., Keene, N. H.
Leland-Gifford Co., Worcester, Mass.
National Automatic Tool Co., S. 7th and N. Sts., Richmond, Ind.
Rockford Drilling Machine Co., Rockford, Ill.

TAPPING MACHINES
Acme Machingery Co., 4533 St. Clair Ave., Cleveland, Ohio
Allen Co., Chas. G., Barre, Mass.
Armstrong-Blum Mfg. Co., Rockford, Ill.
Atlas Press Co., 1819 N. Pitcher St., Kalamazoo, Mich.
Avey Drilling Machine Co., Cincinnati, Ohio
Baker Bros., Inc., Post St. Toledo, Ohio
Barnes Drill Co., 814 Chestnut St., Rockford, Ill.
Bausch Machine Tool Co., 156 Wason Ave., Springfield, Mass.
Bodine Corp., 1720 Fairfield Ave., Bridgeport, Conn.
Boice Crane Co., Toledo, Ohio
Bradford Machine Tool Co., 657 Evans St., Cincinnati, Ohio
Buhr Machine Tool Co., 839 Greene St., Ann Arbor, Mich.
Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y.
Cincinnati Bickford Tool Co., Oakley, Cincinnati, Ohio
Cross Gear & Machine Co., 3250 Bellevue, Detroit, Mich.
Dreses Machine Tool Co., 3366 Beekman St., Cincinnati, Ohio
Etteo Tool Co., 594 Johnson Ave., Brooklyn, N. Y.
Foote-Burt Co., The, 13000 St. Clair Ave., Cleveland, Ohio
Fox Machine Co., 1410 W. Ganson St., Jackson, Mich.
Frew Machine Co., 126 West Venango St., Philadelphia, Pa.
Greenlee Bros. & Co., Twelfth St., and Columbia Ave., Rockford, Ill.
Haskins Co., R. G., 4630 W. Fulton St., Chicago, Ill.
Index Machinery Corp., 49 Central Ave., Cincinnati, Ohio
Charles L. Jarvis Co., Gildersleeve, Conn.
Kingsbury Machine Tool Co., Keene, N. H.
Leland-Gifford Co., Worcester, Mass.
Moline Tool Co., 102-20th St., Moline, Ill.
National Automatic Tool Co., South 7th and N. Sts., Richmond, Indiana
National Machinery Co., Tiffin, Ohio
Rickert-Shafer Co., 613 West 11th St., Erie, Pa.
Stark Tool Co., Waltham, Mass.
Whitney Metal Tool Co., Rockford, Ill.

TAPPING MACHINES, Multiple Spindle
Baker Brs., Inc., Post St., Toledo, Ohio
Baush Machine Tool Co., 156 Wason Ave., Springfield, Mass.
W. F. & John Barnes, Rockford, Ill.
Bradford Machnie Tool Co., 657 Evans St., Cincinnati, Ohio
Defiance Machine Works, Defiance, Ohio
Dreses Machine Tool Co., 3366 Beekman St., Cincinnati, Ohio
Foote-Burt Co., The, 13000 St. Clair Ave., Cleveland, Ohio
Greenlee Bros. & Co., Twelfth St., and Columbia Ave., Rockford, Ill.
Index Machinery Corp., 49 Central Ave., Cincinnati, Ohio
Ingersoll Milling Machines Co., Rockford, Ill.
Moline Tool Co., 102-20th St., Moline, Ill.
National Automatic Tool Co., South 7th and N. Sts., Richmond, Indiana.
National Machinery Co., Tiffin, Ohio

TAPS and DIES
Butterfield Div. (Union Twist Drill Co.), Derby Line, Vt.
Card Mfg. Co., S. W. (Div. Union Twist Drill), Mansfield, Mass.
Champion Blower and Forge Co., Harrisburg Ave., Lancaster, Pa.
Colonial Broach Co., Detroit, Mich.
Detroit Tap & Tool Co., Detroit, Mich.
Geometric Tool Co., Blake & Valley Sts., New Haven, Conn.
Greenfield Tap & Die Corp., Sanderson St., Greenfield, Mass.
Landis Machine Co., Inc., Church & 5th Sts., Waynesboro, Pa.
Michigan Tool Co., Detroit, Mich.
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
Murchey Machine & Tool Co., 951 Porter St., Detroit, Mich.
National Acme Co., Cleveland, Ohio
Pipe Machinery Co., 930 E. 70th St., Cleveland, Ahio
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Standard Tool Co., 6918 Central Ave., Cleveland, Ohio
Union Twist Drill Co., Athol, Mass.
Winter Bros. Co., Wrentham, Mass.

TAPS, Collapsing
Consolidated Machine Tool Corp., Rochester, N. Y.
Geometric Tool Co., Blake & Valley Sts., New Haven, Conn.
Landis Machine Co., Inc., Church & 5th Sts., Waynesboro, Pa.
Murchey Machine & Tool Co., 951 Porter St., Detroit, Mich.
National Acme Co., Cleveland, Ohio
Pipe Machinery Co., 930 E. 70th St., Cleveland, Ahio
Rickert-Shafer Co., 613 West 11th St., Erie, Pa.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio

TAPS, Ground
John Bath & Co., Inc., 18 Grafton St., Worcester, Mass.
Charles H. Besly & Co., 118-124 North Clinton St., Chicago, Ill.
Butterfield Div. (Union Twist Drill Co.), Derby Line, Vt.
Card Mfg. Co., S. W. (Div. Union Twist Drill), Mansfield, Mass.
Colonial Broach Co., Detroit, Mich.
Detroit Tap & Tool Co., Detroit, Mich.
Greenfield Tap & Die Corp., Sanderson St., Greenfield, Mass.
Hanson-Whitney Machine Co., 169 Bartholomew Ave., Hartford, Conn.
Michigan Tool Co., Detroit, Mich.
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Standard Tool Co., 6918 Central Ave., Cleveland, Ohio
Union Twist Drill Co., Athol, Mass.
Winter Bros. Co., Wrentham, Mass.

TEMPLATE COATING
Dayton Rogers Co., Minneapolis, Minn.
Dykem Co., The, 2301 N. Eleventh St., St. Louis, Mo.

TESTING APPARATUS, Hardness
Magna Flux Corp., 605 W. Washington St., Chicago, Ill.
Tinius Olsen Testing Machine Co., 500 N. 12th St., Philadelphia, Pa.
Shore Instrument and Mfg. Co., Jamaica, N. Y.
Wilson Mechanical Instrument Co., 383 Concord Ave., New York, N. Y.

TESTING APPARATUS, Oil
Tagliabue Mfg. Co., C. J., Park & Nostrand Aves., Brooklyn, N. Y.

TESTING MACHINES, Universal
Tinius Olsen Testing Machine Co., 500 N. 12th St., Philadelphia, Pa.

THERMOMETERS
Bristol Company, Waterbury, Conn.
Foxboro Co., 122 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia, Pa.
Strong, Carlisle & Hammond Co., 1392 West Third St., Cleveland, Ohio
Tagliabue Mfg. Co., C. J., Park & Nostrand Ave., Brooklyn, N. Y.
Taylor & Fenn Co., 94 Arch St., Hartford, Conn.
Western Electrical Inst. Corp., 614 Freylinghuysen Ave., Newark, N. J.

THREAD-CUTTING MACHINES

Acme Machinery Co., 4533 St. Clair Ave., Cleveland, Ohio
Automatic Machine Company, Bridgeport, Conn.
Beaver Pipe Tools, Inc., 1937 Amma Ave., Warren, Ohio
Champion Blower & Forge Co., Harrisburg Ave., Lancaster, Pa.
Eastern Machine Screw Corp., Truman & Barclay Sts., New Haven, Conn.
Geometric Tool Co., Blake & Valley Sts., New Haven, Conn.
Goss & deLeeuw Machine Co., New Britain, Conn.
Grant Mfg. & Machine Co., 90 Silliman Ave., Bridgeport, Conn.
Greenfield Tap & Die Corp., Sanderson St., Greenfield, Mass.
Hendey Machine Co., 105 Summer St., Torrington, Conn.
Landis Machine Co., Inc., Church & 5th Sts., Waynesboro, Pa.
Merrel Mfg. Co., 100 Curtis St., Toledo, Ohio
Murchey Machine & Tool Co., 951 Porter St., Detroit, Mich.
National Machinery Co., Greenfield St., Tiffin, Ohio
Oster Mfg. Co., 2057 East 61st Place, Cleveland, Ohio
Pipe Machinery Co., 930 E. 70th St., Cleveland, Ohio
Pratt & Whitney Div. Niles-Bemen-Pond Co., 436 Capitol Ave., Harford, Conn.
Rickert-Shafer Co., 613 West 11th St., Erie, Pa.
Toledo Pipe Threading Machine Co., 1445 Summit St., Toledo, Ohio

THREAD-CUTTING TOOLS

Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Beaver Pipe Tools, Inc., 1937 Amma Ave., Warren, Ohio
Butterfield Div. (Union Twist Drill Co.), Derby Line, Vt.
Card Mfg. Co., S. W., (Div. Union Twist Drill Co.), Mumford Ave., Mansfield, Mass.
Cincinnati Lathe & Tool Co., Oakley, Cincinnati, Ohio
Colonial Broach Co., Detroit, Mich.
Detroit Tap & Tool Co., Detroit, Mich.
Eastern Machine Screw Corp., Truman & Barclay Sts, New Haven, Conn.
Geometric Tool Co., Blake & Valley Sts., New Haven, Conn.
Greenfield Tap & Die Corp., Sanderson St., Greenfield, Mass.
Landis Machine Co., Inc., Church & 5th Sts., Waynesboro, Pa.
Michigan Tool Co., Detroit, Mich.
Murchey Machine & Tool Co., 951 Porter St., Detroit, Mich.
National Acme Co., Cleveland, Ohio
National Twist Drill & Tool Co., 6522 Brush St., Detroit, Mich.
Oster Mfg. Co., The, 2057 East 61st Place, Cleveland, Ohio
Pipe Machinery Co., 930 E. 70th St., Cleveland, Ohio
Pratt & Whitney Div., Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Prosser & Sons, Thos., 15 Gold St., New York, N. Y.
Rickert-Shafer Co., 613 West 11th St., Erie, Pa.
Rivett Lathe & Grinder Co., Inc., 20 Riverview Rd, Brighton, Boston, Mass.
Toledo Pipe Threading Machine Co., 1445 Summit St., Toledo, Ohio
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio
Western Tool & Mfg. Co., Springfield, Ohio

THREAD CUTTING TOOLS

Cemented Carbide (see Tools, Cemented Carbide)

THREAD, Gages

(see Gages, Thread)

THREAD GENERATING MACHINES

Fellows Gear Shaper Co., 78 River St., Springfield, Vermont

THREAD GRINDING MACHINES

Ex-Cello-O Aircraft & Tool Corp., 1200 Oakman Blvd., Detroit, Mich.
Jones & Lamson Machine Co., Springfield, Vt.

THREAD-MILLING MACHINES

Adams Company, East Fourth St., Dubuque, Iowa
Automatic Machine Company, Bridgeport, Conn.
Grob Brothers, West Allis, Wis.
Hall Planetary Co., Fox Street, Philadelphia, Pa.
Hanson-Whitney Machine Co., 169 Bartholomew Ave., Hartford, Conn.
Lees-Bradner Co., 6210 Carnegie Ave., Cleveland, Ohio
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Scherr Co., Inc., Geo., 128 Lafayette St., New York
Taft-Pierce Mfg. Co., Woonsocket, R. I.
Waltham Machine Works, Waltham, Mass.

THREAD-ROLLING MACHINES

National Machinery Co., Greenfield St., Tiffin, Ohio
V. & O. Press Company, Union Turnpike, Hudson, N. Y.
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.

THUMB TACKS

Universal Drafting Machine Co., 1426 West Third St., Cleveland, Ohio

TIERING TRUCKS

Auomatic Transporation Co., 59 West 87th St., Chicago, Ill.

TIMING DEVICES

Automatic Temperature Control Co., Inc., 34 E. Logan St., Philadelphia, Pa.

TIN PLATE

American Sheet & Tin Plate Co., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh, Pa., and Chicago, Ill.
Republic Steel Corp., Republic Bldg., Cleveland, Ohio
Joseph T. Ryerson & Son, Inc., 2558 W. 16th St., Chicago, Ill.

TIRE SETTERS

West Tire Setter Co., 399 Exchange St., Rochester, N. Y.

TOGGLES, Pressure for Presses

Toledo Machine Tool Co., Toledo, Ohio
V. & O. Press Company, The, Union Turnpike, Hudson, N. Y.

TONGS, Lifting

Heppenstall Co., 4620 Hatfield St., Pittsburgh, Pa.

TOOL BITS

Anchor Drawn Steel Co., Pittsburgh, Pa.
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Barber-Colman Co., Rockford, Ill.
Carpenter Steel Co., 109 W. Bern St., Reading, Pa.
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio
Colonial Broach Co., Detroit, Mich.
Colonial Steel Co., Pittsburgh, Pa.
Columbia Tool Steel Co., 425 E. 14th St., Chicago, Ill.
Crucible Steel Co. of America, 405 Lexington Ave., New York
Detroit Tap & Tool Co., Detroit, Mich.
Disston & Sons, Inc., Henry, Tacony, Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Gairing Tool Co., 629 Lafayette Blvd., Detroit
Gorham Tool Co., 14400 Woodrow Wilson Ave., Detroit, Mich.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
Latrobe Electric Steel Co., 2626 S. Ligonier St., Latrobe, Pa.
Ludlum Steel Co., Lock Box 38, Watervliet, N. Y.
Michigan Tool Co., Detroit, Mich.
Ready Tool Co., 550 Iranistan Ave., Bridgeport, Conn.
Union Twist Drill Co., Athol, Mass.
Universal Steel Co., Bridgeville, Pa.
Vanadium Alloys Steel Co., 2400 Grant Bl., Pittsburgh, Pa.
Vincent Steel Process Co., 2434 Bellevue Ave., Detroit, Mich.

TOOL BITS, Cemented Carbide

Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Barber-Colman Co., River & Loomis Sts., Rockford, Ill.
Bethlehem Steel Co., Bethlehem, Pa.
Carboloy Co., Inc., 2987 E. Jefferson Ave., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Ludlum Steel Co., Lock Box 38, Watervliet, N. Y.
Stoody Co., Whittier, Calif.
Super Tool Company, 356 E. Congress St., Detroit, Mich.
Tungsten Elec. Corp., 540-39th St., Union City, N. J.

TOOL CASES

Berger Mfg. Co., (Sub. of Republic Steel Corp.) Canton, Ohio
Gerstner H. & Sons, 156 Columbia St., Dayton, Ohio

TOOL CHESTS

Bergen Mfg. Co., (Sub. of Republic Steel Corp.) Cauton, Ohio
Gerstner, H. & Sons, 156 Columbia St., Dayton, Ohio
Lufkin Rule Co., Saginaw, Mich.
Stanley Tools, New Britain, Conn.
Western Tool & Mfg. Co., Springfield, Ohio

TOOL HOLDERS

Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Cincinnati Lathe & Tool Co., Oakley, Cincinnati, Ohio
Colonial Broach Co., Detroit, Mich.
Detroit Tap & Tool Co., Detroit, Mich.
Errington Mechanical Laboratory, 24 Norwood Ave., Stapleton, Staten Island, N. Y.
Four-Grip Tool Co., 115 E. 17th St., Paterson, N. J.
Gairing Tool Co., 629 Lafayette Blvd., Detroit, Mich.
Gisholt Machine Co., 1301 E. Washington Ave., Madison, Wis.
Michigan Tool Co., Detroit, Mich.
O. K. Tool Co., Shelton, Conn.
Ready Tool Co., Bridgeport, Conn.
Wesson Co., Detroit, Mich.
Western Tool & Mfg. Co., Springfield, Ohio
Williams & Co., J. H., 75 Spring St., New York, N. Y.

TOOL POSTS, Lathe

Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Colonial Broach Co., Detroit, Mich.
Detroit Tap & Tool Co., Detroit, Mich.
Four-Grip Tool Co., 155 E. 17th St., Paterson, N. J.
Hendey Machine Co., 105 Summer St., Torrington, Conn.
McCrosky Tool Corp., 1340-80 South Main St., Main St., Meadville, Pa.
Michigan Tool Co., Detroit, Mich.
O. K. Tool Co., Shelton, Conn.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Reed-Prentice Co., 677 Cambridge St., Worcester, Mass.
Stark Tool Co., Waltham, Mass.

TOOL ROOM LATHES (see Lathes, Tool Room)

TOOL STEEL (see Steel, Tool)

TOOL WORK (see Contract Work)

TOOLS, Cemented-Carbide

Anchor Drawn Steel Co., Pittsburgh, Pa.
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Carboloy Co., Inc., 2987 E. Jefferson Ave., Detroit, Mich.
Cimatool Co., Dayton, Ohio
Colonial Broach Co., Detroit, Mich.
Colonial Steel Co., Pittsburg, Pa.
Detroit Tap & Tool Co., Detroit, Mich.
Disston and Sons, Inc., Henry, Tacony St., Philadelphia, Pa.
Eclipse Counterbore Co., Detroit, Mich.
Ex-Cell-O Aircraft & Tool Corp., 1200 Oakman Blvd., Detroit, Mich.
Heald Machine Co., New Bond St., Worcester, Mass.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
Ingersoll Milling Machine Co., Rockford, Ill.
Michigan Tool Co., Detroit, Mich.
Production Tool Co., 6474 LeGrande Ave., Detroit, Mich.
Super Tool Company, 356 E. Congress St., Detroit, Mich.
Tungsten Elec. Corp., 540-39th St., Union City, N. J.
Vanadium Alloys Steel Co., 2400 Grant Bl., Pittsburgh, Pa.
Wesson Co., Detroit, Mich.

TOOLS, Cutting-off (see Cutting-Off Tools)

TOOLS, Diamond

Desmond-Stephan Mfg. Co., Urbana, Ohio
Gilmore & Co., F. F. 112 Dartmouth St., Boston, Mass.
Gorton Machine Co., George, 1107 13th St., Racine, Wis.
Kershaw, F. A., Kent, Ohio
Mico Instrument Co., 10 Arrow St., Cambridge, Mass.
Super Tool Company, 356 E. Congress St., Detroit, Mich.
Wheel Trueing Tool Co., Detroit, Mich.

TOOLS, Lathe, Shaper and Planer

American Tool Works Co., Pearl & Eggleston Aves., Cincinnati, Ohio
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Cincinnati Lathe & Tool Co., Oakley, Cincinnati, Ohio
Colonial Broach Co., Detroit, Mich.
Detroit Tap & Tool Co., Detroit, Mich.
Ex-Cell-O Aircraft & Tool Corp., 1200 Oakman Blvd., Detroit, Mich.
Gisholt Machine Co., 1301 E. Washington Ave., Madison, Wis.
Gorham Tool Co., 14400 Woodrow Wilson Ave., Detroit, Mich.
Haynes Stellite Co., Kokomo, Indiana
Michigan Tool Co., Detroit, Mich.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Ready Tool Co., 550 Iranistan Ave., Tool .... & Mfg. Co., Springfield, Ohio
Williams & Co., J. H., 75 Spring St., N. Y.

TOOLS, Safety Non-Sparking

Ampco Metal Co., 3830 W. Burnham St., Milwaukee, Wis.
Stanley Tools, New Britain, Conn.

TOOLS TURNING

R. & L. Tools, Nicetown, Philadelphia, Pa.

TORCH, Portable Gas

Air Reduction Sales Company, 60 East 42nd St., New York, N. Y.
American Gas Furnace Co., Elizabeth, N. J.
Stark Tool Co., Waltham, Mass.

TRACTORS, Electric and Gasoline
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Automatic Transportation Co., 59 West 87th St, Chicago, Ill.
Baker-Raulang Co., 2164 W. 25th St., Cleveland, Ohio
Elwell-Parker Electric Co., 4511 St. Clair Ave., Cleveland, Ohio
Mercury Mfg. Co., 4044 South Halsted St., Chicago, Ill.
Yale & Towne Mfg. Co., Philadelphia Division, 4530 Tacony St, Philadelphia, Pa.

TRAILERS, Factory, Warehouse, etc.
All Steel Welded Truck Corp., 1145 Railroad Ave., Rockford, Ill.
Baker-Raulang Co., 2164 W. 25th St., Cleveland, Ohio
Easton Car & Const. Co., Easton, Pa.
Mercury Mfg Co., 4044 South Halsted St., Chicago, Ill.
Yale & Towne Mfg. Co., Philadelphia Div., 4530 Tacony St., Philadelphia, Pa.

TRAMRAILS
American Mono-Rail Co., 13113 Athens Ave., Cleveland, Ohio
Cleveland Crane & Engrg. Co., Wickliffe, Ohio
Osborne Mfg. Co., 5401 Hamilton Ave., Cleveland, Ohio

TRANSFORMERS
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
DeLaval Steam Turbine Co., Trenton, N. J.
Forbes & Myers, 170 Union St., Worcester
General Electric Co, Schenectady, N. Y.
Jefferson Electric Co., Bellewood, Ill.
Martin Electric Co., 705 Pequette St., Detroit, Mich.
Wagner Electric Corp., 6444 Plymouth Ave., St. Louis, Mo.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

TRANSMISSION EQUIPMENT
Ahlberg Bearing Co., 317 E. 29th St., Chicago, Ill.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Boston Gear Works, Inc., North Quincy, Mass.
Chicago Rawhide Mfg. Co., Chicago, Ill.
Cullman Wheel Co., Chicago, Ill.
Dayton Rubber Mfg. Co., Dayton, Ohio
De Laval Steam Turbine Co., Trenton, N. J.
Diamond Chain & Mfg. Co., 402 Kentucky Ave., Indianapolis, Ind.
Dodge Mfg. Corp., Mishawaka, Ind.
Earle Gear & Mach. Co., 4707 Stenton Ave., Philadelphia, Pa.
Fafnir Bearing Co., New Britain, Conn.
Farrel-Birmingham Co., Inc., 355 Vulcan St., Buffalo, N. Y.
Gates Rubber Co., Denver, Colo.
Carlyle Johnson Machine Co., 52 Main St., Manchester, Conn.
Link-Belt Co., 2410 W. 18th St., Chicago, Ill.
Morse Chain Co., Ithaca, N. Y.
Palmer-Bee Co., Westminster and G.T.R.R., Detroit, Mich.
S.K.F. Industries, Inc., Philadelphia, Pa.
Savage Co., W. J., Clinch Ave., and Tenth St., Knoxville, Tenn.
Slaysman & Co., 813 E. Pratt St., Baltimore,
Winfield H. Smith, Inc., Springville, Erie County, N. Y.
Standard Pressed Steel Co., Jenkintown, Pa.

TRANSMISSION MACHINERY (see Hangers, Shafts, Pulleys, Clutches, Belting Chains)

TRANSMISSIONS, Hydraulic
American Engineering Co., 2407 Aramingo Ave., Philadelphia, Pa.
Hydraulic Press Mfg. Co., Mount Gilead, Ohio
Oilgear Co., 1403 W. Bruce St., Milwaukee, Wis.
Vickers Incorporated, 1400 Oakman Blvd., Detroit, Mich.

TRANSMISSION, Variable Speed
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Engineering Co., 2407 Aramingo Ave., Philadelphia, Pa.
Boston Gear Works, Inc., North Quincy, Mass.
Earle Gear & Machine Co., 4707 Stenton Ave., Philadelphia, Pa.
Dodge Mfg. Corp., Mishawaka, Ind.
Ganschow Gear Co., 1013 Washington Blvd., Chicago, Ill.
Graham Transmissions, 78 River St., Springfield, Vt.
Hydraulic Press Mfg. Co., Mt. Gilead, Ohio
Link-Belt Co., 2045 Hunting Post Ave., Philadelphia, Pa.
New Departure Mfg. Co., Bristol, Conn.
Oilgear Co., 1403 W. Bruce St., Milwaukee, Wis.
Palmer-Bee Inc., Westminister & G. T. R. R. Detroit, Mich.
Philadelphia, Gear Works, Philadelphia, Pa.
Reeves Pulley Co., Columbus, Indiana
Sterling Electric Motors, Telegraph Road, Los Angeles, Calif.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

THREAD, Safety
Norton Company, Worcester, Mass.

TRIMMING MACHINES
Automatic Machine Company, Bridgeport, Conn.
Slaysman and Co., 813 E. Pratt St., Baltimore, Md.

TROLLEYS—I Beam or Monorail
Curtis Pneumatic Machinery Co., 1924 Kienlen Ave., St. Louis, Mo.
Round and Son, David, Newburgh Station, Cleveland, Ohio

TRUCKS, Factory
All Steel Welded Truck Corp., 1145 Railroad Ave., Rockford, Ill.
Automatic Transportation Co., 59 West 87th St., Chicago, Ill.
Baker-Raulang Co., 2164 W. 25th St., Cleveland, Ohio
Continental Diamond Fibre Co., Newark, Delaware
Barrett-Cravens Co., 3255 W. 30th St., Chicago, Ill.
Elwell-Parker Electric Co., 4511 St. Clair Ave., Cleveland, Ohio
Francis Co., Charles E., Rushville, Ind.
Lyon Iron Works, 71 Madison St., Greene, N. Y.
Mercury Mfg. Co., 4044 South Halsted St., Chicago, Ill.
Pollard Bros. Mfg. Co., 4444 N. Knox Ave., Chicago, Ill.
Standard Pressed Steel Co., Jenkintown, Pa.
Western Tool & Mfg. Co., Springfield, Ohio
Yale & Towne Mfg. Co., Philadelphia Div., 4530 Tacony St., Philadelphia, Pa.

TRUCKS, Gas and Electric
Easton Car and Construction Co., Easton, Pa.

TRUCKS, Hand Lift
All Steel Welded Truck Corp., 1145 Railroad Ave., Rockford, Ill.
Barrett-Cravens Co., 3255 W. 30th St., Chicago, Ill.
Lyon Iron Works, 71 Madison St., Greene, N. Y.
Standard Pressed Steel Co., Jenkintown, Pa.
Yale & Towne Mfg. Co., Philadelphia, Div., 4530 Tacony St., Philadelphia, Pa.

TRUCKS, Storage Battery
Automatic Transportation Co., 59 West 87th St., Chicago, Ill.
Baker-Raulang Co., 2164 W. 25th St., Cleveland, Ohio
Easton Car & Construction Co., Easton, Pa.
Elwell-Parker Electric Co., 4511 St. Clair Ave., Cleveland, Ohio
Mercury Mfg. Co., 4044 South Halsted St., Chicago, Ill.
Yale & Towne Mfg. Co., Philadelphia Div., 4530 Tacony St., Philadelphia, Pa.

TUBING ALUMINUM
Aluminum Co. of America, 2107 Gulf Bldg., Pittsburgh, Pa.

TUBING, Brass, Bronze, Copper
American Brass Co., Waterbury, Conn.
Revere Copper & Brass Corp., 230 Park Ave., New York, N. Y.
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Tite-Flex Metal Hose Co., 500 Frelinghuysen Ave., Newark, N. J.

TUBING, Fibre, Bakelite and Mica
Continental Diamond Fibre Co., Newark, Delaware
Formica Insulation Co., 4614 Spring Grove Ave., Cincinnati, Ohio
General Electric Co., Schenectady, N. Y.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

TUBING, Flexible Metal
American Brass Co. (American Metal Hose Branch), Waterbury, Conn.
Tite-Flex Metal Hose Co., 500 Frelinghuysen Ave., Newark, N. J.

TUBING, Seamless
Aluminum Co. of America, Pittsburgh, Pa.
American Brass Co., Waterbury, Conn.
Driver-Harris Co., Harrison, N. J.
Hydraulic Press Mfg. Co., Mount Gilead, Ohio
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
National Tube Co., 1802 Frick Bldg., Pittsburgh, Pa.
Pittsburgh Steel Co., Union Trust Bldg., Pittsburgh, Pa.
Revere Copper & Brass Corp., 230 Park Ave., New York
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Synthane Corporation, Oaks, Pa.
Timken Steel & Tubes, Inc., Canton, Ohio

TUBING, Stainless Steel
Crucible Steel Co. of America, 405 Lexington Ave., New York
National Tube Co., 1802 Frick Bldg., Pittsburgh, Pa.
Pittsburgh Steel Co., Union Trust Bldg., Pittsburgh, Pa.
Republic Steel Corp., Republic Bldg., Cleveland, Ohio
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Timken Steel & Tubes, Inc., Canton, Ohio

TUMBLING BARRELS
Baird Machine Co., Bridgeport, Conn.
Globe Machine & Stamping Co., 1250 West 76th St., Cleveland, Ohio
Ransohoff, N., Inc., Carthage, Cincinnati

TURBINES, Steam
General Electric Co., Schenectady, N. Y.
Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa.

TURNBUCKLES
Bethlem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh, Pa.

TURRET LATHES (see Lathes, Horizontal and Vertical Turret)

TURRET MACHINES, (see Lathes, Horizontal and Vertical Turret)

TWIST DRILLS
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio
Greenfield Tap & Die Corp., Sanderson St., Greenfield, Ill.
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Standard Tool Co., 6918 Central Ave., Cleveland, Ohio
Union Twist Drill Co., Athol, Mass.

UNIONS, PIPE
Aluminum Co. of America, Pittsburgh, Pa.
Dart Mfg. Co., E. M., 134 Thurbers Ave., Providence, R. I.
Hydraulic Press Mfg. Co., Mount Gilead, Ohio
Revere Copper & Brass Corp., 230 Park Ave., New York, N. Y.
Watson-Stillman Co., Roselle, N. J.

UNIVERSAL JOINTS
Apex Mach. & Tool Co., Dayton, Ohio
Baush Machine Tool Co., 156 Wason Ave., Springfield, Mass.
Borgeson Mfg. Co., Bridgeport, Conn.
Boston Gear Works, Inc., North Quincy, Mass.
Gray & Prior Machine Co., 69 Suffield St., Hartford, Conn.
Hanson Clutch & Machinery Co., Tiffin, Ohio
Moline Tool Co., 102 Twentieth St., Moline, Ill.
National Autmoatic Tool Co., South 7th and N. Sts., Richmond, Ind.
Philadelphia Gear Works, Philadelphia, Pa.

UPSETTING FORGING MACHINES
Ajax Mfg. Co., Euclid Branch P.O., Cleveland, Ohio
National Machinery Co., Tiffin, Ohio

USED MACHINERY (see Searchlight Section)
Atlas Equipment Co., 116 S. Clinton St., Chicago, Ill.
Adams, Ogden R., 66 State St., Rochester
Alliance Machinery Co. 206 Centre St., New York, N. Y.
Armel, J. P., Pittsburgh, Penna.
Beal & Co., Jos., 465 Atlantic Ave., Boston,
Beatty Machy. & Mfg. Co., 948 150th St., Hammond, Ind.
Belyea Co., Inc., 151 W. 18th St., N. Y. C.
Bernstein, G. M., 10 So. Clinton St., Chicago
Botwinik Bros., Inc., New Haven, Conn., (67 Water St.)
Bradley Machy. Co., 529 E. Jefferson Ave., Detroit, Mich.
Brant, W. E., Machinery Co., 513 Empire Bldg., Pittsburgh, Penna.
Buffalo Machy. Co., 833 Grant St., Buffalo
Cincinnati Machy. & Supply Co., 28 W. 2nd St., Cincinnati, Ohio
Delta Equipment Co., 148 N. 3rd St. Philadelphia, Penna.
Dony Machine Co., D. E., 1115 Bay St., Rochester N. Y.
Eastern Machinery Co., 3260 Spring Grove Ave., Cincinnati, Ohio
Emerman & Co., Louis E., 1761 Elston Ave., Chicago, Ill.
Falk Mill Supply Co., Inc., 18 Ward St., Rochester, New York
Fraser, E. L., 141 N. Third St., Philadelphia, Penna.
French, F. A., 635 S. Braddock Ave., Pittsburgh, Penna.
Ganey Machinery Co., 125 Arthur St., Buffalo, N. Y.
General Machinery Corp., 140 Federal St., Boston, Mass.
Goldman Co., Harvey H., 10567 Gratiot Ave., Detroit, Michigan
Hill-Clarke Machinery Co., 651 Washington Blvd., Chicago, Ill.
Hyman & Son, Jos., Tioga, Livingston and Almond Sts., Philadelphia, Penna.
Indianapolis Machy. & Supply Co., 1959 S. Meridian St., Indianapolis, Ind.
Industrial Equipt. Co., 850 Broad St., Newark, N. J.
Industrial Machy. Co., 2100 Fletcher Ave., Indianapolis, Ind.
International Machinery Co., 3171 Bellevue Ave., Detroit, Michigan
Interstate Machinery Co., 130 S. Clinton St., Chicago, Ill.
Iron & Steel Products Co., Railway Exchange, Chicago, Ill.

USED MACHINERY, etc. (Cont.)
Iroquois Machinery Co., 662 Ohio St., Buffalo, New York
Land, L. J., 140 Grand St., New York City
Leach Machinery Co., H., 296 Dyer St. Providence, R. I.
Lucas & Son, Inc., J. L., 3 Fox St., Bridgeport, Conn.
Lunney, Frank J., 953 N. Front St., Phila., Pa.
Machinery Dealers, Inc., 419 Chapel St., New Haven, Conn.
Marr-Galbreath Machinery Co., 57 Water St., Pittsburgh, Penna.
McCabe & Sheeran Machy. Corp., 50 Church St., N. Y. C.
Midwest Equipment Co., 630 W. Lake St., Chicago, Ill.
Miles Machinery Co., Saginaw, S. W. Mich.
Monarch Machinery Co., 329 No. Third St., Philadelphia, Penna.
Morey Machinery Co., Inc., 410 Broome St., New York City
Motor Repair & Mfg. Co., The, 1548 Hamilton Ave., Cleveland, Ohio
Moyer, J. N., 465 North 5th St., Philadelphia, Penna.
O'Brien Machinery Co., 113 N. 13th St., Philadelphia, Penna.
Ott Machinery Sales, Inc., 546 2nd Ave., Detroit, Michigan
Patron-Millwright Machy & Transmission Co., 154 Grand St., New York, N. Y.
Reliance Machy. Sales Co., 1407 Brighton Rd. N. S., Pittsburgh, Penna.
Reynolds & Son, Inc., Geo. T., 171 Pine St., Providence, R. I.
Riverside Machinery Depot, 251 St. Aubin Ave., Detroit, Michigan
Rosenkranz & Weisbecker, 149 Broadway, New York City
Ross Power Eq. Co., Indianapolis, Ind.
Scott-Bansbach, 4611 W. 20th St., Chicago., Ill.
Segal Machinery Co., 113 S. Clinton St., Chicago, Ill.
Simmons Machine Tool Corp., North Broad-Way, Albany, New York
Standard Machinery & Suply Co., The, 218 High Street, Boston, Mass.
Strong Carlisle & Hammond Co., 1392 W. 3rd St., Cleveland, Ohio
Sun Machinery Co., Inc., 39 Van Buren St., Newark, N. J.
Surplus Material & Machy. Co., 8733 Kercheval Ave., Detroit, Michigan
Tupholme Co., Pittsfield, Mass.
Vine, R. A., 652 W. Willis Ave., Detroit, Michigan
Victor Machinery Co., 128 S. Clinton St., Chicago, Ill.
Wiener Mchy. Co., 237 Centre St., N. Y. C.
Vickers Incorporated, 1400 Oakman Blvd.,
West Penn Machinery Co., 1208 House Building, Pittsburgh, Pa.
Wigglesworth Machinery Co., 199 Bent St., Cambridge, Mass.
Wrol Co., C. I., 11 Park Place, New York City
Wyatt Machinery Co., C. G., 1203 Princess Ave., Camden, N. J.

VALVES, Air Control
Barber-Colman Co., Rockford, Ill.
Bristol Co., Waterbury, Conn.
Curtis Pneumatic Machinery Co., 1924 Kienlen Ave., St. Louis, Mo.
Foxboro Co., 122 Neponset Ave., Foxboro, Mass.
Galland-Henning Mfg. Co., Milwaukee, Wis.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Homestead Valve Mfg. Co., Coraopolis, Pa.
Hannifin Mfg. Co., 621 South Kolamer Ave., Chicago, Ill.
Keckley, C. O., 567 Washington Blvd., Chicago, Ill.
Logansport Machine Inc., Logansport, Ind.
Nicholson & Co., W. H., 114 Oregon St., Wilkes-Barre, Pa.
Ohio Brass Co., Mansfield, O.
Philadelphia Gear Works, Philadelphia, Pa.
Tagliabue Mfg. Co., C. J., Park & Nostrand Ave., Brooklyn, N. Y.
Tomkins-Johnson Co., The, 615 N. Mechanic St., Jackson, Mich.

VALVES, Electrically Operated
Atkins, E. C. and Co., 402 S. Illinois St., Indianapolis, Ind.
Automatic Temperature Control Co., 34 E. Logan St., Pittsburgh, Pa.
Barber-Colman Co., Rockford, Ill.
Bristol Co., Waterbury, Conn.
Chapman Valve Mfg. Co., Pinevale St., Indian Orchard, Mass.
Foxboro Co., 122 Neponset Ave., Foxboro, Mass.
Homestead Valve Mfg. Co., Coraopolis, Pa.
Hannifin Mfg. Co., 621 South Kolmar Ave., Chicago, Ill.
Hydraulic Press Mfg. Co., Mount Gilead, Ohio
Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia, Pa.
Logansport Machine Inc., Logansport, Ind.
Keckley, C. O., 567 Washington Blvd., Chicago, Ill.
Nicholson & Co., W. H., 114 Oregon St., Wilkes-Barre, Pa.
Oilgear Co., The, 1403 W. Bruce St., Milwaukee, Wis.
Philadelphia Gear Works, Philadelphia, Pa.
Reading-Pratt & Cady Div. Amer. Chain & Cable Co., Inc., Bridgeport, Conn.
Vickers Incorporated, 1400 Oakman Blvd., Detroit, Mich.

VALVES, Hydraulic
Baldwin-Southwark Corp., Paschall P. O. Station, Philadelphia, Pa.
Chapman Valve Mfg. Co., Pinevale St., Indian Orchard, Mass.
Elmes Engineering Wks., Chas F., 1001 Fulton St., Chicago, Ill.
Galland-Henning Mfg. Co., Milwaukee, Wis.
Hannifin Mfg. Co., 621 South Kolmar Ave., Chicago, Ill.
Homestead Valve Co., Coraopolis, Pa.
Hydraulic Press Mfg. Co., Mt. Gilead, Ohio
Keckley, C. O., 567 Washington Blvd., Chicago, Ill.
Logansport Machine Inc., Logansport, Indiana
National Automatic Tool Co., South 7th and N. Sts., Richmond, Indiana
Nicholson & Co., W. H., 114 Oregon St., Wilkes-Barre, Pa.
Oilgear Co., The, 1403 W. Bruce St., Milwaukee, Wis.
Racine Tool & Mach. Co., Racine, Wis.
Vickers Incorporated, 1400 Oakman Blvd., Detroit, Mich.
Watson-Stillman Co., Roselle, N. J.

VARIABLE SPEED TRANSMISSIONS (see Transmission, Variable Speed)

VARNISHES
Bakelite Corporation, Bound Brook, N. J.
Maas & Waldstein, Newark, N. J.

V-BELTS
Allis-Chalmers Mfg. Co., Milwaukee, Wisc.
Boston Gear Works, Inc., North Quincy, Mass.
Delta Mfg. Co., Vienna Ave., Milwaukee, Wis.
Dodge Mfg. Corp., Mishawaka, Ind.
Gates Rubber Co., Denver, Colo.
Gilmer Co., L. H., Tacony, Philadelphia, Pa.
Goodrich, B. F., Co., 576 South Main St., Akron, Ohio
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan Inc., Passaic, N. J.
Republic Rubber Co., Youngstown, O.
Savage Co., W. J., Clinch Ave., and Tenth St., Knoxville, Tenn.
Starrett, L. S., Co., Crescent St. Athol Mass.,

V BLOCKS
Brown & Sharpe Mfg. Co., Providence, R. I.
Graham Mfg. Co., 73 Willard Ave., Providence
Greenfield Tap & Die Corporation, Sanderson St., Greenfield, Mass.
Pratt & Whitney Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Sheffield Gage Corp., Dayton, Ohio
Taft-Peirce Mfg. Co., The, 32 Mechanic Ave., Woonsocket, R. I.

VERNIERS
Brown & Sharpe Mfg. Co., Providence, R. I.

VIBRATION DAMPENING
Felters Co. Inc., 210 South St., Boston, Mass.

VISES, Air Operated
Hannifin Mfg. Co., 621 South Kolmar Ave., Chicago, Ill.
Logansport Machine Inc., Logansport, Indiana.
Skinner Chuck Co., 344 Church St., New Britain, Conn.
Tompkins-Johnson Co., 615 N. Mechanic St., Jackson, Mich.

VISES, Drilling Machine
Armstrong-Blum Mfg. Co., 333 N. Francisco Ave., Chicago, Ill.
Armstrong Bros. Too Co., 315 N. Francisco Ave., Chicago, Ill.
Athol Machine and Foundry Co., 82 South St., Athol, Mass.
Brown & Sharpe Mfg. Co., Providence, R. I.
Champion Blower and Forge Co., Harrisburg Ave., Lancaster, Pa.
Desmond-Shephan Mfg. Co., Urbana, Ohio
Foster Machine Co., 1100 Beasley Ave., Elkhart, Ind.
Graham Mfg. Co., 73 Willard Ave., Providence, R. I.
Knight Machinery Co., W. R., 3920 West Pine Blvd., St. Louis, Mo.
Logansport Machine Inc., Logansport, Indiana.
Martin Tool & Die Works, 545 W. State St., Springfield, Ohio
Modern Machine Tool Co., Jackson, Mich.
Skinner Chuck Co., 344 Church St., New Britain, Conn.
Wesson Co., Detroit, Mich.

VISES, Jig
Athol Machine & Foundry Co., 82 South St., Athol, Mass.
Graham Mfg. Co., 71 Willard Ave., Providence
Martin Tool & Die Works, 545 W. State St., Springfield, Ohio
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Wesson Co., Detroit, Mich.

VISES, Machinsts' Bench
American Chain Div. of Amer. Chain & Cable Co., Inc., 929 Connecticut Ave., Bridgeport, Conn.
Athol Machine & Foundry Co., 82 South St., Athol, Mass.
Brown & Sharpe Mfg. Co., Providence, R. I.
Desmond-Stephan Mfg. Co., Urbana, Ohio
Western Tool & Mfg. Co., Springfield, Ohio

VISES, Milling Machine
Athol Machine & Foundry Co., 82 South St., Athol, Mass.
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Machine Co., Cincinnati, Ohio
Cochrane-Bly Co., 15 St. James St., Rochester
Hartford Special Machinery Co., 282 Homestead Ave., Hartford, Conn.
Kearney & Trecker Corporation, 6784 West National Ave., Milwaukee, Wis.
Knight Machinery Co., W. B., 3620 W. Pine Blvd., St. Louis, Mo.
Martin Tool & Die Works, 545 State St., Springfield, Ohio
Skinner Chuck Co., 344 Church St., New Britain, Conn.

VISES, Pipe
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Athol Machine & Foundry Co., 82 South St., Athol, Mass.
Greenfield Tap & Die Corp., Sandersou St., Greenfield, Mass.
Toledo Pipe Threading Machine Co., 1445 Summit St., Toledo, Ohio
Wiedemann Machine Co., 1815 Sedgley Ave., Philadelphia, Pa.
Williams & Co., J. H., 75 Spring St., New York, N. Y.

VISES, Planer and Shaper
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Planer Co., 3120 Forrer St., Oakley, Cincinnati, Ohio
Cincinnati Shaper Co., Hopple & Garrard, Cincinnati, Ohio
Columbia Machine Tool Co., 1798 Fairgrove Ave., Hamilton, Ohio
Gould & Eberhardt, 480 Chancellor Ave., Irvington, N. J.
Graham Mfg. Co., 73 Willard Ave., Providence, R. I.
Hendey Machine Co., 105 Summer St., Torrington, Conn.
Martin Tool & Die Works, 545 W. State St., Springfield, Ohio
Skinner Chuck Co., 344 Church St., New Britain, Conn.
Wesson Co., Detroit, Mich.

VISES, Sawing
Beaver Pipe Tools, Inc., 1937 Amma Ave., Warren, Ohio

VISES, Universal
Covel Mfg. Co., Benton Harbor, Mich.

VOLTMETERS
Bristol Company, Waterbury, Conn.
Western Electrical Inst. Corp., 614 Freylinghuysen Ave., Newark, N. J.

WASHERS
Aluminum Co. of America, Pittsburgh, Pa.
Boston Gear Works, Inc., North Quincy, Ill.
Chicago Rawhide Mfg. Co., Chicago, Ill.
Continental Diamond Fibre Co. Newark, Del.
Felters Co. Inc., South St., Boston, Mass.
Formica Insulation Co., 4614 Spring Grove Ave., Cincinnati, Ohio
Houghton & Co., E. F., Philadelphia, Pa.
National Motor Bearing Co., 1100 78th Ave., Oakland, Calif.
Republic Steel Corp., Republic Bldg., Cleveland, Ohio
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Synthane Corp. Oaks, Pa.

WASHERS, Cast Bronze
Bunting Brass & Bronze Co., 715 Spencer St., Toledo, Ohio
Johnson Bronze Co., 100 S. Mill St., New Castle, Pa.
Wrought Washer Mfg. Co., Bay St., Milwaukee, Wis.

WASHERS, Fibre
Continental Diamond Fibre Co., Newark, Del.
Formica Insulation Co., 4614 Spring Grove Ave., Cincinnati, Ohio
Wrought Washer Mfg. Co., Bay St., Milwaukee, Wis.

WASHERS, Laminated
Laminated Shim Co., 21-14—44th Ave., Long Island City, N. Y.
Wrought Washer Mfg. Co., Bay St., Milwaukee, Wis.

WATTMETERS
Western Electrical Inst. Corp., 614 Freylinghuysen Ave., Newark, N. J.
Westinghouse Elec. & Mfg. Co., East Pittsburg, Pa.

WELDING ELECTRODE HOLDERS
Jackson Electrode Holder Co., 6533 Woodward Ave., Detroit, Mich.

WELDING AND CUTTING MACHINES AND Equipment, Oxy-Acetylene
Air Reduction Sales Company, 60 East 42nd St., New York, N. Y.

WELDING AND CUTTING MACHINES, etc. (Cont.)
Linde Air Products Co., 30 E. 42nd St., New York, N. Y.
Oster Mfg. Co., The, 2057 East 61st Place, Cleveland, Ohio
Walls Sales Corp., 96 Warren St., N. Y.

WELDING GOGGLES AND HELMETS
Air Reduction Sales Company, 60 East 42nd St., New York, N. Y.
Allen-Bradley Co., 1326 South Second St., Milwaukee, Wis.
American Optical Co., Southbridge, Mass.
Harnischfeger Corp., 4400 W. National Ave., Milwaukee, Wis.
Hobart Bros. Co., Box FR-17, Troy, Ohio
Linde Air Products Co., 30 E. 42nd St., New York, N. Y.

WELDING GUNS
Martin Electric Co., 705 Piquette St., Detroit, Mich.

WELDING MACHINES, Butt
Atkins, E. C. and Co., 402 S. Illinois St., Indianapolis, Ind.
Martin Electric Co., 705 Piquette St., Detroit, Mich.
Ohio Machine Tool Co., Kenton, Ohio
Thompson-Gibb Electric Welding Co., Lynn, Mass.

WELDING MACHINES, Electric Arc
Air Reduction Sales Company, 60 East 42nd St., New York, N. Y.
General Electric Co., Schenectady, N. Y.
Harnischfeger Corp., 4400 W. National Ave., Milwaukee, Wis.
Hobart Bros. Co., Box FR-17, Troy, Ohio
Lincoln Electric Co., Cleveland, Ohio
Miller Electric Mfg. Co. Inc., 905 N. Meade St., Appleton, Wis.
Ohio Brass Co., Mansfield, Ohio
Pier Equipment Mfg. Co., Milton & Cross Sts., Benton Harbor, Mich.
Una Welding Co., Cleveland, Ohio
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

WELDING MACHINES, Flash
Martin Electric Co., 705 Piquette St., Detroit
Ohio Machine Tool Co., Kenton, Ohio
Thompson-Gibb Electric Welding Co., Lynnn, Mass.

WELDING MACHINES, Seam
Martin Electric Co., 705 Piquette St., Detroit
Ohio Machine Tool Co., Kenton, Ohio
Thompson-Gibb Electric Welding Co., Lynn, Mass.

WELDING MACHINES, Spot
Eisler Engineering Co., Inc., Newark, N. J.
Martin Electric Co., 705 Piquette St., Detroit, Mich.
Ohio Machine Tool Co., Kenton, Ohio
Pier Equipment Mfg. Co., Milton & Cross Sts., Benton Harbor, Mich.
Progressive Welder Co., Detroit, Mich.
Thompson-Gibb Electric Welding Co., Lynn, Mass.

WELDING RODS
Air Reduction Sales Company, 60 East 42nd St., New York, N Y.
American Brass Co., Waterbury, Conn.
Atkins & Co., E. C., 424 So. Illinois St., Indianapolis, Ind.
Colmonoy Inc., P. O. Box 977, Los Nietos Calif.
Driver-Harris Co., Harrison, N. J.
Eisler Engineering Co., Inc., Newark, N. J.
Harnischefeger Corp., 4400 W. National Ave., Milwaukee, Wis.
Haynes Stellite Co., Kokomo, Indiana.
Hobart Bros. Co., Box FR-17, Troy, Ohio
Hoskins Mfg. Co., 4445 Lawton Ave., Detroit, Mich.
Lincoln Electric Co., Cleveland, Ohio
Linde Air Products Co., 30 E. 42nd St. N. Y. C.
Ludlum Steel Co., Lock Box 38, Watervliet, N. Y.
Ohio Brass Co., Mansfield, Ohio
Pittsburgh Steel Co., Union Trust Bldg., Pittsburgh, Pa.
Thomas Prosser & Son, 15 Gold St., New York
Revere Copper & Brass Corp., 230 Park Ave., New York, N. Y.
Ryerson & Co., Inc., Jos. T., 16th and Rockwell Sts., Chicago, Ill.
Una Welding Co., Cleveland, Ohio
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Wickwire Spencer Steel Co., 41 E. 42nd St., New York

WELDING RODS, Aluminum
Aluminum Co. of America, Pittsburgh, Pa.
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.

WELDING SHIELDS
American Optical Co., Southbridge, Mass.
General Electric Co., Schenectady, N. Y.
Lincoln Electric Co., Cleveland, Ohio
Ohio Brass Co., Mansfield, Ohio

WELDING SUPPLIES
Air Reduction Sales Company, 60 East 42nd St., New York, N. Y.
Lincoln Electric Co., Cleveland, Ohio
Linde Air Products Co., 30 E 42nd St., New York City
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Wickwire Spencer Steel Co., New York City

WELDING TIMERS
Electric Controller & Mfg. Co., 2700 E. 79th St., Cleveland, Ohio
Welding Timer Mfg. Co., Inc., 251 Ogden St., Newark, N. J.

WHITE PRINT PROCESS
Ozalid Corp., 354 Fourth Ave., New York

WINCHES
Round and Son, David, Newburgh Station, Cleveland, Ohio
Shepard Niles Crane & Hoist Co., Montour Falls, N. Y.

WIRE CLOTH
Wickwire Spencer Steel Co., New York City,

WIRE, Cold Heading
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.
Jones & Laughlin Steel Corp., Pittsburgh
Pittsburgh Steel Co., Union Trust Bldg., Pittsburgh, Pa.
Union Drawn Steel Co., Massillon, Ohio
Universal Steel Co., Bridgeville, Pa.
Wickwire Spencer Steel Co., 41 E. 42nd St., New York

WIRE, Copper, Brass and Bronze
American Brass Co., Waterbury, Conn.
General Electric Co., Schenectady, N. Y.
Revere Copper & Brass Corp., 230 Park Ave., New York, N. Y.

WIRE, Electric Resistance
American Brass Co., Waterbury, Conn.
Baker & Co., Inc., 54 Austin St., Newark, N. J.
Crucible Steel Co., of America, 405 Lexington Ave., New York, N. Y.
Driver-Harris Co., Harrison, N. J.
Hoskins Mfg. Co., 4445 Lawton Ave., Detroit

WIRE, Flat, Round, Square or Special Shapes
American Brass Co., Waterbury, Conn.
Firth-Stirling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Page Steel & Wire Div., Amer. Chain & Cable Co., Inc., Monessen, Pa.
Pitsburgh Steel Co., Union Trust Bldg., Pittsburgh, Pa.
Wickwire Spencer Steel Co., New York City

WIRE, Piano and Music
Firth-Sterling Steel Co., McKeesport, Pa.
Wickwire Spencer Steel Co., New York City

WIRE ROPE
American Cable Div. of Am. Chain & Cable Co. Inc., 250 Park Ave., New York, N. Y.
Hazard Wire Rope Div. of Am. Chain & Cable Co., Inc., Wilkes-Barre, Pa.
Wickwire Spencer Steel Co., New York City, N. Y.

WIRE, Stainless Steel
American Steel & Wire Co., Chicago, Ill.
Carpenter Steel Co., 109 W. Bern St., Reading, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Ludlum Steel Co., Lock Box 38, Watervliet, N. Y.
Page Steel and Wire Division of American Chain & Cable Company, Inc., Monessen, Penna.
Pittsburgh Steel Co., Union Trust Bldg., Pittsburgh, Pa.
Republic Steel Corp., Republic Bldg., Cleveland, Ohio
Wickwire Spencer Steel Co., 41 E. 42nd St., New York

WIRE, Steel
American Steel & Wire Co., Chicago, Ill.
Carpenter Steel Co., 109 W. Bern St., Reading, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Page Steel and Wire Division of American Chain & Cable Company, Inc., Monessen, Penna.
Pittsburgh Steel Co., Union Trust Bldg., Pittsburgh, Pa.
Wickwire Spencer Steel Co., 41 E. 42nd St., New York

WIRE NAIL MACHINES
National Machinery Co., Greenfield St., Tiffin, Ohio
Joseph T. Ryerson & Son Inc., 2558 W. 16th St., Chicago, Ill.

WOODWORKING MACHINERY
Barnes Co., W. F. & John, Rockford, Ill.
Boice Crane Co., Toledo, Ohio
Defiance Machine Works, Defiance, Ohio
DeWalt Products Corp., Fountain Ave., Lancaster, Pa.
Greenlee Bros. & Co., Twelfth St. and Columbia Ave., Rockford, Ill.
Mattison Machine Works, Blackhawk Park Ave., and C. B. & Q. Tracks, Rockford, Ill.
Oliver Machinery Co., Grand Rapids, Mich.

WORM CUTTING MACHINES
Adams Company, East Fourth St., Dubuque, Iowa
Colonial Broach Co., Detroit, Mich.
Detroit Tap & Tool Co., Detroit, Mich.
Fellows Gear Shaper Co., 78 River St., Springfield, Vermont
Gould & Eberhardt, 480 Chancellor Ave., Irvington, N. J.
Michigan Tool Co., Detroit, Mich.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.
Scherr Co., Inc., Geo., 128 Lafayette St., New York, N. Y.

WORM DRIVES
Baush Machine Tool Co., 156 Wason Ave., Springfield, Mass.
Bilgram Gear & Machine Works, 1223 Spring Garden St., Philadelphia, Pa.
Boston Gear Works, Inc., North Quincy, Ill.
Chicago Rawhide Mfg. Co., Chicago, Ill.
Colonial Broach Co., Detroit, Mich.
Chas. E. Crofoot Gear Corporation, South Easton, Mass.
DeLaval Steam Turbine Co., Trenton, N. J.
Detroit Tap & Tool Co., Detroit, Mich.
Earle Gear & Mach. Co., 4707 Stenton Ave., Philadelphia, Pa.
Ganschow Gear Co., 1013 Washington Blvd., Chicago, Ill.
Gear Specialties, Inc., 2635 Canton St., Chicago, Ill.
Grant Gear Works, Inc., 154 W. Second St., South Boston, Mass.
Link Belt Company, 2045 W. Hunting Post Ave., Phila., Pa.
Mechanical Specialties, Inc., 2635 Canton St., Chicago, Ill.
Meisel Press Mfg. Co., Boston, Mass.
Michigan Tool Co., Detroit, Mich.
Philadelphia Gear Works, Philadelphia, Pa.
Winfield H. Smith Inc., Springville, Erie County, N. Y.

WORMS, Hourglass Cutting Machines
Earle Gear & Mach. Co., 4707 Stenton Ave., Philadelphia, Pa.
Fellows Gear Shaper Co., 78 River St., Springfield, Vermont
Michigan Tool Co., Detroit, Mich.

WRENCHES, Chain
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
J. H. Williams & Co., 75 Spring St., N. Y.

WRENCHES, Drop Forged
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Black-Hawk Mfg. Co., Milwaukee, Wis.
Bonney Forge and Tool Works, Allentown, Pa.

WRENCHES, Pipe
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Bonney Forge and Tool Works, Allentown, Pa.
Greene, Tweed & Co., 109 Duane St., New York, N. Y.
Greenfield Tap & Die Corp., Sanderson St., Greenfield, Mass.
Williams Co., J. H., 75 Spring St., N. Y.

WRENCHES FOR PORTABLE TOOLS
Apex Machine and Tool Co., Dayton, Ohio

WRENCHES, Ratchet
Armstrong Bros. Tool Co., 315 N. Francisco Ave., Chicago, Ill.
Bonney Forge and Tool Works, Allentown, Pa.
Greene, Tweed & Co., 109 Duanne St., New York, N. Y.
Starrett Co., The L. S. Crescent St., Athol, Mass.
Williams & Co., J. H., 75 Spring St., N. Y.

WRENCHES, Tap
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Champion Blower and Forge Co., Harrisburg Ave., Lancaster, Pa.
Greenfield Tap & Die Corp., Sanderson St., Greenfield, Mass.
Morse Twist Drill & Mach. Co., 163 Pleasant St., New Bedford, Mass.
Pratt & Whitney Co., Div. Niles-Bement-Pond Co., 436 Capitol Ave., Hartford, Conn.
Standard Tool Co., The, 6918 Central Ave., Cleveland, Ohio
Starrett Co., The L. S., Crescent St., Athol, Mass.

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